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GYNECOLOGICAL DIAGNOSIS
GENERAL
GYNECOLOGICAL THERAPEUSIS
BY
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ELECTRICITY
IN
GYNECOLOGY AND OBSTETRICS
BY
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WITH ONE HUNDRED AND SIXTY FINE WOOD ENGRAVINGS.

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PART I.

Gynecological Diagnosis.

Gynecological Diagnosis

AND

General Gynecological Therapeusis.

CHAPTER I.

INTRODUCTORY REMARKS.

EVEN at the time of Hippocrates, Soranus and Galen, the treatment of the diseases of women had reached a high grade of development, but the science only began to be established on a firm basis, when exact methods of physical diagnosis, the use of the sound, and of specula of various nature, of dilating measures, and above all when the bimanual examination had raised it to a level with other constituent parts of surgery.

Although in France, as early as the year 1550, midwifery was largely taught by eminent surgeons, it was not till the last century (Grégoire 1720, Fried 1728, Heister 1754, Roederer, C. C. v. Siebold, Denman, and others) that male students of medicine received practical instruction in obstetrics. With the opening of the first lying-in hospitals (in Germany by Roederer, of Gottingen, 1751) began the separation between surgery and obstetrics, but until recent times gynecology remained simply a connecting link between them. Up to to-day indeed a large majority of pure gynecological cases were admitted and treated in surgical clinics, and from surgeons were formed the most distinguished gynecologists and teachers of the present day.

The study of gynecology, that is to say, of women and their diseases, is much more difficult than that of the other sciences. This difficulty is in part dependent on the fact that the art is as yet in a partly formative stage, and that more brilliant results are more easily obtainable in other departments of medicine, for methods of research in gynecology are by no means so certain as is sometimes claimed So long as the results from examination by means of the tactile sense differ so markedly in the diagnosis of the diseases of women,—and this is what is to be expected from the position of the genital organs,—so long is it impossible to compare these results from those obtainable from the use of the other senses. There is certainly a vast difference between the perception of a color, of a tone, and the sensation of hardness, softness, etc. The tactile sensations acquired by one individual are different from those acquired by another. One man may think he has reached exactness, and form such a scale for himself, but it is difficult to impart the same to another. In addition to the obstacles in the way of exact diagnosis from the side of the sense of touch, many of the organs of generation, as for instance the tubes, the ovaries, and the ligaments, are still, notwithstanding the progress made in our methods, frequently inaccessible to careful examination, and yet it is all-essential that the student should be made to feel for himself, in order that he may properly acquire the necessary knowledge. In almost every other department of medicine the opportunities for instruction are better; as, for instance, that which may be learned from percussion and auscultation, from the use of the ophthalmoscope, laryngeal mirror, ear speculum, and further the demonstration of external diseases is possible to a greater number without damage to the patients. Far otherwise is it in gynecology, where the number who examine must needs be less. It is noteworthy, too, that as yet the number of gynecological clinics is small. It is furthermore directly to the interests of the teachers, of the learners, and of the patients as well, that gynecology should be rendered entirely separate from obstetrics, and that there should be separate clinics and instruction in the one and in the other.

A further, and possibly the greatest, obstacle in the way of the pupil, is the psychical behavior of the patients; the impossibility of obtaining exact data in the history, and the reluctance with which women submit to examination by the physician.

The uncertainty of the results of our objective examination makes it all the more important that we should obtain all possible information in regard to the symptoms, a task which is often very difficult, and yet on it frequently must depend the diagnosis and the treatment, since we must resort to symptomatic treatment in many cases of chronic incurable affections, in particular when through minor therapeutical measures we may obtain time for the institution of more radical means.

The exact obtaining of the symptoms requires much patience and ingenuity on the part of the physician, but still more the proper appreciation of the relation existing between these symptoms and the afterward determined changes in the genital organs, the more so since many of the symptoms may be present in conjunction with any disease of these organs.

The symptoms which may be evoked in distant organs by disease in the genital system are: gastric, very frequently, such as heaviness in the stomach, regurgitation, nausea, vomiting, loss of appetite; further abnormal function of the sensory, motor and trophic nerves, which are included under the term hysteria, such as hyperesthesia, anesthesia, neuralgias (migraine, intercostal, mastodynia, etc.); spasms, vaginismus, the globus hystericus, singultus, general convulsions, respiratory spasms; further, paralysis, local congestions, chloasma, acne, eczema, urticaria; finally, alterations in the psychical functions. Although, in times past, on the authority of Romberg, hysteria was considered as ever a reflex neurosis from the genital organs, to-day we have gone to the opposite extreme, since there are very few who grant much connection between gynecology and neuropathology. When, however, we see a marked case of hysteria or neurasthenia, etc., cured concomitantly with the relief of some affection of the genital system, it is very difficult to persuade oneself that there does not exist a direct causal connection between the two affections, and in many instances, indeed, the nerve tracts may be demonstrated along which the reflex influence may extend. In other instances, indeed, the relation is not so clear, and we are not in a position to affirm that we have weighed all the etiological factors correctly, that the diagnosis was exact, or the treatment justified. A more careful estimation, indeed, of the cause of hysteria rests in the future; at any rate we are not further concerned with it here. Still, whether we consider hysteria as a reflex neurosis, or as due to lack of nutrition of the nerves, and a resulting weakness of their elements, or not, the truth is that it is the duty of the physician to allay any possible source of irritation, and it is apparent that the gynecologist most frequently sees the organs whence such irritability may emanate.

It is seldom that those symptoms are lacking which proceed from the genital organs themselves or from those in the neighborhood, such as abnormal sensations of heaviness, of distension, of sharp, penetrating, lancinating, dragging pain in the abdomen or in the back, which frequently are marked in the intermenstrual period; further anomalies in secretion, either qualitative or quantitative; and finally, disturbances in function. The menstrual periods are irregular, either too profuse or too scanty, they are accompanied by varying painful manifestations, cohabitation is a torment, or sensation is absent, or the act is not possible; frequently there exists sterility either from lack of conception, or from lack of ovulation.

From the side of the neighboring organs we may mention: Swelling of the abdomen, disturbances of vesical or rectal function; dysuria, retention and incontinence of urine, painful defæcation, constipation, rectal tenesmus, hemorrhoids, and finally, cystitis, pyelitis, compression and obliteration of the ureters, with the consecutive changes, inflammation of the rectum, the large intestine, etc.

The etiological factors must be inquired into after the obtaining of the symptoms, and it is of the highest possible importance to remember that it is not sufficient to obtain one symptom or a group of symptoms, but that we must study the individual in her entirety. As a rule, the patients themselves volunteer the relation of their symptoms, and they will simply become confused if the physician endeavors to force upon them a different manner of telling their story. There are instances, however, where the symptoms complained of will direct attention in an entirely different direction.

The etiological factors concern the health of the parents, of the sisters, of the grandparents (heredity), of early childhood (anomalies in development, scrofula, syphilis, rachitis), the first appearance of menstruation and its after course, later diseases (chlorosis, heart affections), abortions and labors, the course of the puerperium, the climacteric period, and finally, the diseases which have affected the patient.

These etiological factors may be grouped as predisposing or as direct, the latter being the social condition of the patient and her manner of life, trauma, excesses of various nature, (venery, infectious coitus, onany, etc.), the application of pessaries, injections, caustics, injuries during labor, etc., and the length of time since, and the circumstances under which the injuries were received. Menstrual hyperemia, the puerperium, the period of puberty, and of the change of life, are the most important etiological factors.

CHAPTER II.

DESCRIPTION OF THE METHODS OF EXAMINATION AND THE OBTAINABLE RESULTS.

HAVING obtained the rational history, the physical signs are next to be determined. There are a number of diagnostic measures at our disposal, for the examination of the internal genital organs, the vagina, the uterus, the ovaries, the tubes, the ligaments, which although they are not different from the same measures as used in surgery, still are somewhat peculiar from the position of the above organs. Certain of the methods of examination are not at all special, such as acupuncture, the exploratory incision, the diagnostic excision, and they will, in connection with the chemical and microscopical examination of the excretions, secretions and tissues be spoken of together with the description of special diseases of the genital organs. Aside from these, the following methods are at our disposal:

a. Examination by means of the sense of touch: Palpation of the abdomen, the touch, including the combined examination by the vagina, rectum, urethra, bladder, the use of the sound.

b. Examination by sight: Inspection, mensuration, the speculum.

c. Examination by the hearing: Percussion and auscultation.

The older writers, Meissner and others, claimed that they also reached a diagnosis by means of the smell, but to-day taste and smell are not included among our diagnostic measures. In addition, however, there are instances where, in order to reach a more exact diagnosis, it is necessary to dilate the genital canal, in particular the cervix, by bloody or non-bloody operative means.

Other authors have divided the methods of examination differently, as, for instance, West into manual, instrumental and ocular inspection, Hegar and Kaltenbach and Schröder into manual and instrumental, Kiwisch and Amann into external and internal means, etc. We will, however, describe the methods of examination in the order in which practical experience has sanctioned their usage.

The general routine differs, of course, according to circumstances, but ordinarily it will be as follows: Inspection of the abdomen (possibly the mammæ), palpation, mensuration, percussion and auscultation, inspection of the external genitals, simple and combined touch of the vagina, and, if necessary, of the rectum and the bladder, the use of the sound and of the speculum. Dilatation of the cervix for diagnostic purposes, as well as artificial prolapse of the uterus, always follow resort to the other methods, and, therefore, are spoken of last and as preparatory to therapeutical measures. The above routine scheme is the simplest, but it may often have to be altered.

In making an examination, also, it is essential in our own interest to follow a certain routine. It is wrong simply to proceed far enough in our examination to reach a diagnosis which will explain the symptoms, for thus we may overlook essential abnormalities, either on account of faulty estimation of the cause of the symptoms, or else because those detected give rise to no symptoms. It is our business to make a complete exhaustive examination, and to search the genital system as well for the presence as for the absence of abnormalities.

Sometimes external causes render an exhaustive diagnosis impossible. Aside from the objections of the individual, which are, however, rarely insuperable,—and the higher the individual in the social scale, the less the resistance,—there occur narrowings and occlusions of the genital canal, which render the touch and the specular examination impossible. The puerperal state, certain kinds of hemorrhage, contra-indicate the sound, as also inflammatory affections of the uterus or its surroundings, processes which necessitate examination with the greatest possible care.

In no other branch of medicine may injury be so readily inflicted during an examination, as in gynecology. The more skilled the examiner the more carefully and gently will he examine, and aside from the risk of inflicting injury, we should proceed gently in order not to add pain to the disagreeable nature of the examination. The simple vaginal touch may even cause inflammation, denudation of epithelium and hemorrhage; the bimanual palpation may lead to tearing of adhesions, rupture of cysts, etc.; the sound and the speculum, if roughly used, may cause great and even fatal injury, as also the dilating measures and discission of the cervix. Here, as in case of every manipulation, we must estimate the worth of the exploratory method as regards the obtainable results with the possible dangers to which we subject the patient.

In general, it is of indisputable importance to reach an exact diagnosis at the first examination, but this is often difficult or else impossible. In case of version and flexion of the uterus, tumors of this organ or of its annexes, suspicion of pregnancy or carcinoma, repeated examinations are essential, in order to determine the influence of distension of the rectum and of the bladder, of bodily exertion, of menstrual hyperemia, on the position of the genital organs, and on the alterations in size or consistency. In difficult cases, especially of tumors, a control examination is especially necessary.

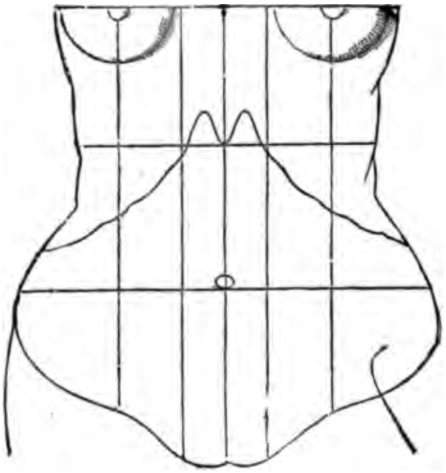

FIG. 1.—SCHEME. (After *Spencer Wells.*)

The intermenstrual period should be elected for examination and local treatment, for the reason that then the conditions approximate nearer the normal, and there is less danger of inflicting injury. Simpson, however, in 1844, pointed out that the changes present during menstruation may be utilized for purposes of diagnosis, especially since the cervix is patent, and it is possible to penetrate partially into the uterine cavity, and to recognize abnormalities, the determination of which would otherwise call for diagnostic dilatation. It is peculiarly important in case we suspect fibroids, intra-uterine polypi, or foreign bodies in the uterus, to examine during the period of menstruation.

The examination had best be undertaken at a time of the day when the individual is under normal conditions. After eating or exertion an examination had better, if possible, not be undertaken, also during the course of an intercurrent disease, which renders the patient locally or generally more sensitive.

The results of the examination should be recorded. It is of great assistance to use a scheme like those devised by J. B. Schultze, Spencer Wells, Beigel, Kocks, and others, in which the findings may be outlined.

CHAPTER III.

THE POSITION OF USE IN GYNECOLOGICAL EXAMINATIONS.

THE simple vaginal examination, the most important of all methods, is performed in one or another position of the body, in standing, in the dorsal, abdominal or lateral position; but when it is desirable to make a complete examination, or when other means besides the touch are to be used, then that position is to be chosen, in which these methods may be resorted to in the simplest and most thorough manner, and with the least possible exposure of the patient.

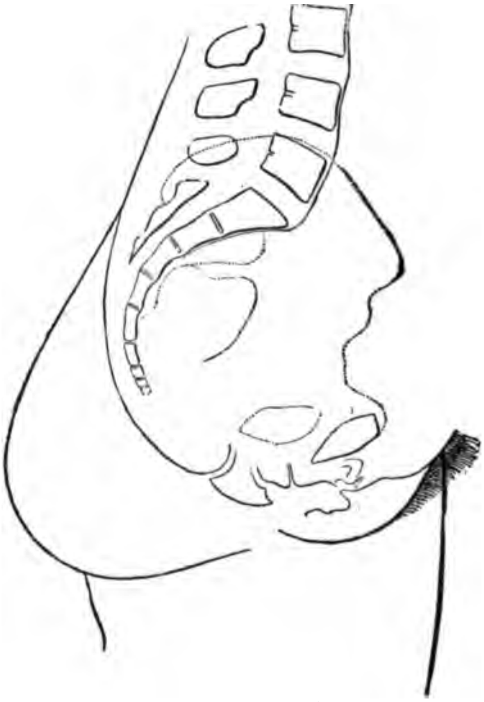

FIG. 2.—SCHEME OF THE PELVIS. (After *Schultze*.)

Accordingly, for the purposes of a gynecological examination, the following positions are of utility: 1. The standing; 2. The dorsal; 3. The abdominal; 4. The lateral. The dorsal position is subdivided as follows by Hegar and Kaltenbach: *a*. The flat dorsal, where the occiput, the spinous processes, the shoulder blades, the lower part of the sacrum, the knees and heels of the patient are in the horizontal line, or where the thighs are only bent sufficiently to make a right angle with the legs. *b*. The dorsal position, where the thighs are sharply flexed so that the knees rest against the thorax (Simon's position). 3. That position where the upper part of the body is lifted up, that is to say bent towards the pelvis, (the lithotomy position).

By the abdominal position is meant that in which the posterior surface of the body looks upward. The pure abdominal position is of no utility for an examination of the genital organs, but the intermediate postures, such as the knee-elbow or the knee-chest, have many advantages.

Only that lateral position is of use where the thighs are bent at a right angle to the hips, and the sacral vertebral surface is brought upwards, a position which is a combination of the lateral and the dorsal. (Sims's lateral position.)

For the purpose of these different positions, excepting of course the erect, an examining table is necessary. Where the patient is very sick we are often obliged to make our examination by the bedside, and the abdominal as well as the vaginal examination may be well instituted, provided the mattress be not too soft. Where it is necessary to use instruments, a bolster should be placed under the pelvis of the patient, so that the external genital organs may be raised to a higher level, and the buttocks be brought to the very edge of the bed, the feet resting on chairs, and thus a fairly free access to the genital organs may be attained. The majority of gynecologists use more or less complicated and convenient examining couches, such as those of Holmes, Baumgartner, Bozeman, Brühs, Leblond, Chadwick and others.

Whatever table is used should have the following characteristics: It should be long enough and broad enough to allow of the assumption of any of the desired positions, and it should be accessible from all sides, with no elevated ridges. It should be high enough not to cause the examiner to stoop overmuch, in order to palpate or auscultate and inspect the genitals, without assuming a fatiguing position. The table should be firm, with no sharp edges, and it should have attachable feet supports, like those of Fritsch's, as well as a movable top, which can be lifted up. A suitable couch may be improvised in almost any house out of a four-legged table, with mattress and bolster, but the feet of the patient must be held by assistants.

Whenever possible the examination should be conducted with the patient on such a table, and before a window with a good light. Still we are often obliged to rest satisfied with a bed or a sofa, and on the latter most of the methods of exploration may be used, provided it be broad enough and high enough not to strain the examiner, and provided there be a good light.

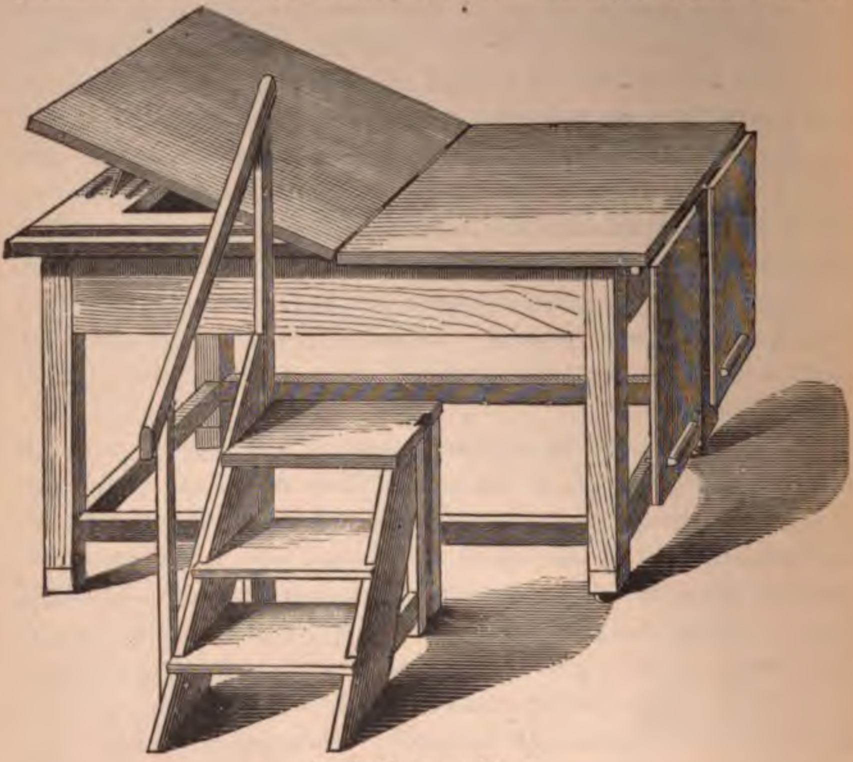

FIG. 3.—EXAMINING TABLE.

[The table which the practitioner needs will vary according to the amount of gynecological practice he has. The construction of a table is a simple matter, and any carpenter can make one ample in every respect for general use. Aside from the desiderata mentioned by Chrobak, it is essential that the table possess both the lateral and the horizontal inclinations. Except in an emergency the sofa or the bed are utterly inadequate for the purposes of a thorough examination. The various chairs are complicated. The tables which we figure are as convenient and inexpensive as any, our individual preference being rather in favor of Goodell's, on account of its simplicity and perfect adaptability to any position. The Chadwick table has the disadvantage of not possessing the lateral inclination, a decided defect if the examiner has no nurse to hold the speculum. The Daggett table we have never personally used, but it

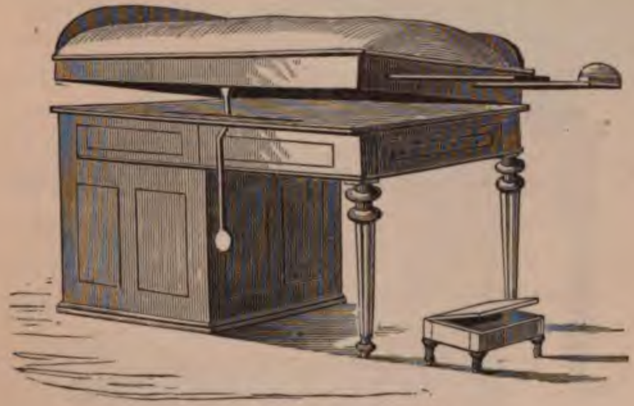

FIG. 4.—GOODELL'S EXAMINING TABLE.

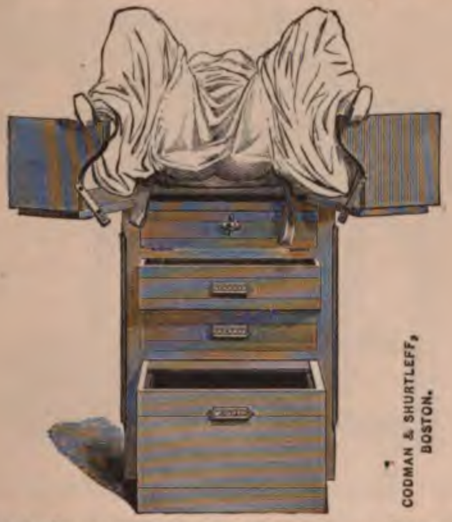

FIG. 5.—CHADWICK'S EXAMINING TABLE, DORSAL POSITION.

is simple in construction, has the essential inclinations, and may be obtained at very low rates.

The objection urged against the examining table, that the patient will demur against lying on it, is not at all valid. There is absolutely no more exposure on it than when the patient is in a chair, or on a lounge, and the greater ease in examination, as well as the more perfect results, are unquestionable.—Ed.]

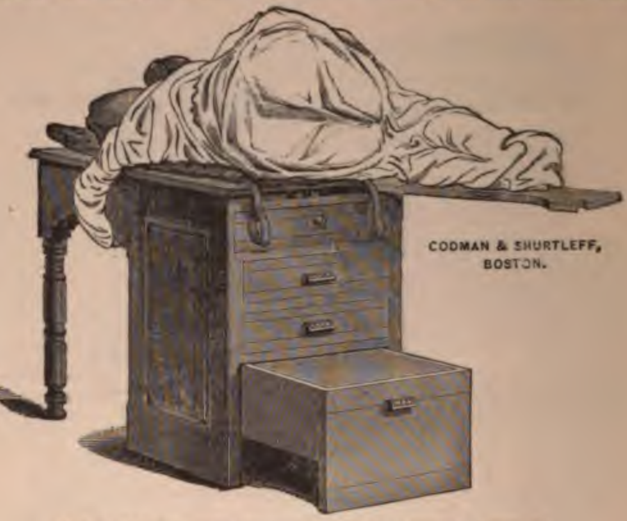

Fig. 6.—Chadwick's Examining Table, Lateral Position.

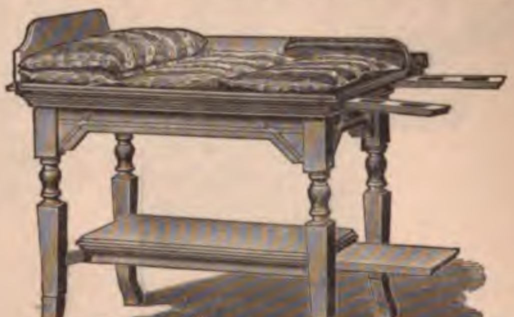
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Fig. 7.—Daggett's Examining Table, Dorsal Position.

As regards the position of the pelvis in the various positions, we borrow the following passage from Hegar and Kaltenbach: In the erect position the plane of the pelvic inlet makes an angle of 55° with a horizontal plane passed through the upper border of the symphysis, and an angle of 45° with a similar plane passing through the centre of the symphysis; the apex of the coccyx is on a little higher level than the lower border of the symphysis pubis (according to Nägele .8 of an inch), its upper border about 3.5 inches below the level of the promontory. The foramen ovale is a trifle lower than the inferior border of the symphysis; the vagina runs from in front downwards, and from below upwards, its orifice and the external genitals looking nearly directly backwards. The urethra lies forwards, the anus behind the introitus vaginæ. The intra-abdominal pressure, in the ordinarily erect posture, is positive, measuring according to Schatz, from 25 to 30 cubic centimetres, being lessened on marked protrusion of the abdomen, and increased on marked contraction. The normal and normally movable uterus sinks down a little and forwards, and seems heavier on account of the weight of the superincumbent abdominal contents. Displacements of the uterus are generally intensified, although they may be lessened. The changes in position of the pelvic organs give frequently very valuable information in regard to the state of the ligaments under the influence of pressure, from distension of the neighboring rectum and bladder. While, for example, when the bladder is empty, the uterus is anteverted, which position is intensified in the erect posture; and while in case of distended bladder in the upright position, the uterus sinks deeper, where there exists shortening of the ligaments on one side, which is not detected in the dorsal position, in the erect position lateral deviation may be recognized.

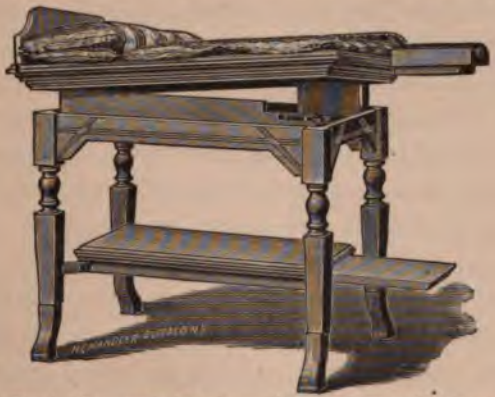

FIG. 8.—DAGGETT'S EXAMINING TABLE, LATERAL POSITION.

The examination in the erect position must needs be incomplete. Simple vaginal touch may be made, but the bimanual is impossible, owing to the contraction of the abdominal muscles, and the advantage of having the uterus nearer the finger is offset by the fact that the thick nates prevent deep insertion of the hand. Inspection of the external and internal genitals cannot, of course, be resorted to. Notwithstanding, the erect position is frequently used when we are desirous of quickly informing ourselves of all that is possible by the vaginal touch, and further, in case of version, flexion, or descent of the uterus, when we desire to determine the influence of abdominal pressure on the displacement or on any body foreign to the pelvis, or on the position of tampons or pessaries, which we may have inserted into the vagina.

In Germany and in France the dorsal positions are mainly used for purposes of examination, and it has wrongly been objected to these positions that they are more uncomfortable and exposing than the lateral position, which the Americans and the English use. Since Sims popularized examination by means of the speculum in the lateral position, it has also frequently been used for the vaginal touch, and under certain conditions it has advantages even as has the knee-elbow. In the dorsal position palpation, percussion and auscultation may be performed to better advantage, the vaginal touch, the sound, and inspection certainly as well as in the lateral, but the bimanual palpation can unquestionably be better resorted to in the dorsal than in the lateral or abdominal positions, and chloroform is more readily administered.

The simple dorsal position, with the body straightened out, is the most unfavorable for examination. The abdomen is ordinarily convex externally and tense, the intra-abdominal pressure, although less than in the erect position, is greater than when the thighs are flexed at about a right angle, and the entrance into the genitals is more difficult in comparison with any position where the pelvis is lifted up or bent backwards. In this position the plane of the pelvic inlet forms an angle of 30° with a horizontal plane through the sacral promontory, the angle opening outwards, the symphysis from above backwards and from below forwards, at an angle of 45°, and a horizontal plane through the promontory cuts the upper half of the introitus vaginæ, and the dorsal column makes with the conjugate an angle of 135° opening forwards. When in this position the thighs are flexed, changes of various kinds occur. Slight flexion is expended at the hip joint, and the inclination of the pelvis is not altered. When the flexion is greater the pelvis is lifted, the vertebral column is straightened out, there is movement between the vertebræ and slightly at the sacro-iliac synchondrosis. The angle at the junction of the dorsal vertebræ with the sacrum is increased, and that with the plane of the pelvic inlet is lessened. Where the flexion is not exaggerated, the pelvis rests on the middle of the sacrum, but in case of great flexion the sacrum is lifted up so much that it only rests on its upper transverse processes, and on the lower part of the iliac crests. The symphysis approximates the horizontal plane, and its upper surface the promontory and the manubrium of the sternum. The symphysis becomes the highest point of the bony pelvis, the foramen ovale lies directly under it, or a trifle anteriorly, the vagina extends from above and it points sharply downward and backward, its direction approaching the perpendicular.

The amount of intra-abdominal pressure is very variable; the more the pelvis is lifted upwards against the thorax, the less the abdominal pressure, although it may be increased by the sharp flexion of the thighs and traction on the pelvis, since thus the space in the abdominal cavity is lessened. Nevertheless it is possible to render the pressure in the abdominal cavity negative by lifting up the pelvis of the patient, and by a combination of certain respiratory movements. (Schatz, Hegar.)

The position most frequently used for operations (Simon's), where the thighs are flexed and slightly abducted, may be assumed on any flat table without the presence of assistants, provided the soles of the feet are supported. The abdominal walls are relaxed, so that external and combined palpation may be resorted to with great ease, and there is ample space for the use of the sound or the speculum, in cases where we do not intend attempting a difficult operation within the pelvis. Every other dorsal position, with greater inclination of the pelvis, requires the help of at least two assistants, or of some apparatus for holding the legs. It is advantageous, in addition, to lift the pelvis up by means of one or more pillows, or by means of a movable central portion of the examining table.

Of the various abdominal positions, the knee-elbow, as used by Sims as early as 1845, is the most frequently utilized. The patient kneels on the table, the legs resting flat upon it, and the knees being separated about ten inches. The upper portion of the body is supported on the elbows, the forearms lying flat upon the table, or, better still, to either side of the head, which rests on a pillow. The elbows are wide apart, the spinal column assumes a curve, concave upwards. The opening of the pelvis looks nearly directly downwards, the plane of the pelvic inlet meets the horizontal at a very acute angle directed forwards and upwards, approaching the horizontal when the spinal column is greatly depressed, the symphysis is almost vertical, as also the entrance to the vagina and the anus. If the clothing of the patient is well loosened, the muscles of the abdomen relaxed, and if the patient breathes with the thorax, then all the abdominal organs gravitate forwards and downwards, and the pressure in the pelvis becomes negative. It is sufficient now to pull apart the labia, and air rushes into the vagina, the uterus sinks downwards and the vagina balloons out. The anterior vaginal wall rises and falls synchronously with the respiration, to such an extent often that it is difficult to see into the vagina. (Kristeller's respiratio vaginalis.) The same entrance of air takes place into the rectum when the anus is open, as also into the bladder through an inserted catheter. Where the sphincter vaginæ is much relaxed, or that of the anus, the air rushes in spontaneously without separation of the opening into these canals, often audibly, and the same occurs where there is laceration of the perineum. When the patient quickly changes her position, the air is driven out audibly, unless the precaution is taken to keep the vagina open by the finger, or else by a catheter. The knee-elbow position is of special utility in cases where we wish to examine the pelvic organs in the absence of intra-abdominal pressure, or else to test the effect of diminution of this pressure on the position of the uterus in connection with tumors. All the pelvic viscera and tumors gravitate upwards in so far as their attachments will permit, and it is thus often possible to differentiate tumors which appear to be connected with the uterus. Small quantities of fluid, which may have escaped notice in the dorsal position, flow towards the lowest point, and may be recognized by percussion in the neighborhood of the umbilicus; tumors which before occupied the posterior part of the pelvis, approach the abdominal wall and the palpating fingers. Palpation is, on the contrary, more difficult, owing to the sagging against the hand of the abdominal wall and the pelvic contents; every conjoined manipulation is also less readily applicable, as also the simple vaginal touch, since the vagina is stretched out, and the uterus has gravitated forward and downward, and is less readily reached. When a speculum is inserted, we are able to see the entire vaginal wall and a portion of the posterior pouch, and in this position operations on the anterior vaginal wall are most readily performed.

The knee-elbow position may be assumed on any table or in any bed which is not too soft, and the upper part of the body, since the position is a tiresome one, may be supported on bolsters with the precaution that they do not interfere overmuch with the thoracic breathing. The pelvis must be so steadied by assistants, as to keep the thighs vertical, for the patients always tend to extend the thighs and to deviate the pelvis anteriorly. To maintain the body in this position during operations, Bozeman has devised a table and fixation apparatus, on which the patient may readily be kept anesthetized.

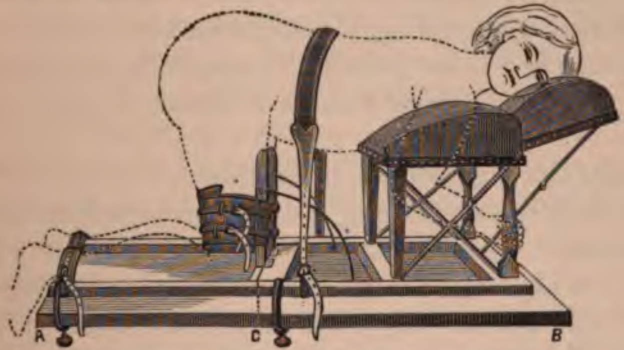

FIG. 9.—BOZEMAN'S TABLE. (*Bandl.*)

The pure lateral position, with the knees drawn up, is of advantage for the inspection of the external genital organs, in particular the perineum, the anus and its neighborhood; it may also be utilized for the better palpation of certain tumors, as for instance in case of floating kidney, and for testing the movability of certain tumors; further, by causing the patient to lie on first one side and then on the other, the alteration of the percussion note in case of fluid in the abdominal cavity may be determined.

The position devised by Sims and almost uniformly used by him is one between a lateral and an abdominal position. The patient reclines on her left side, so that the genitals are opposite the window, the legs being drawn up about at a right angle to the thorax, the right leg a trifle more than the left; a cushion laid between the knees separates conveniently the legs. The left hand is placed on the back, the thorax against the table, so that the head rests on the left parietal bone. In this position the pelvis is supported on the anterior part of the left crest of the ilium, and on the left trochanter, the right iliac crest being the highest point of the body. The vertebral column is deviated a trifle from the vertical, the sagittal plane of the pelvis intersects the left thigh, the anterior surface of the sacrum looking downward and forward. When the examiner stands behind the patient, about opposite the introitus vaginæ, the anterior vaginal wall lies to the right and below, the posterior wall to the left and above, the right lateral wall of the uterus above and to the right, the left wall below and to the left. If the upper part of the body is prone, the anterior part of the body against the table, then the intra-abdominal pressure is lowered, and it becomes the greater the more the thighs are flexed against the thorax, and the nearer the body approaches the pure lateral position. In comparison with the knee-elbow position, the intra-abdominal pressure is greater, but still it may sink to *nil*.

The right lateral position may be used as well as the left. The harder and more resisting the examining table, the better may the lateral position be assumed. On a soft couch or in bed, the pelvis sinks in so deeply that the great advantage of this position, the lessened abdominal pressure, is largely lost. For the insertion of the duck-bill speculum, the introduction of the sound, tents and dilators, for the examination of the rectum, or the combined examination of the rectum and the vagina, for the exposure of the anterior vaginal wall, which in this position also rises and falls with the respiratory movements, the Sims position is very advantageous, in particular since it is far less unpleasant and tiresome than the knee-elbow.

CHAPTER IV.

THE INSPECTION OF THE ABDOMEN.

SIMPLE inspection without the help of instruments concerns the general appearance of the body: the size, weight, walk, configuration and inclination of the pelvis, curvature of the vertebral column, the size and surface of the abdomen, the inguinal region, the lower extremities, the development and coloration of the mammæ, the nipples and the areolæ. The external genital organs, the internal surfaces of the thighs, the lower third of the vagina when the vulva is open, may be inspected without the help of instruments, and inspection should always precede resort to the touch or to the speculum.

For purposes of careful inspection the different portions of the body are uncovered, in the order in which the examination is made; palpation may often, however, be made to follow inspection to advantage, as for instance where it is a question of spinal deformity. According to circumstances inspection may be undertaken with the patient standing or lying, but in any event care should be taken to have the attitude a symmetrical one. The changes in the shape of the abdomen are often of the greatest possible value, since free fluid in the abdominal cavity will cause the abdomen to assume a different shape from what happens, for instance, in case of a cyst.

The chief value of inspection is for the detection of deformities of the bony skeleton, and above all abnormality in the abdomen. The size of the abdomen is to be noted, and as to whether the normal convexity is present or else a concavity, as in case of thin individuals, or as the result of certain disease, diarrhœa, for instance, or lead poisoning, or certain mental troubles, etc. The amount of increase or of decrease in size, the regular or irregular distension, the form of the abdomen, the site of the greatest convexity, the position of the umbilicus, in particular its retraction or projection, the quality of the abdominal walls, that is to say, their distensibility, etc., are further points to be noted. In excessive distension of the abdomen, the skin is either smooth, white and shiny, or else streaked red or purple-red. In women who have borne children, or else have suffered from some cause of abdominal distension, there are present on the abdomen those reddish to whitish streaks, the lineæ albicantes, which are due to tears of the fibrils of the rete malpighii, and which are erroneously considered a sign of child-bearing. From the researches of Credé, Casper, and C. Langer, it is evident that these striæ are not certain evidence of antecedent pregnancy, for out of 100 cases in ten none were present. These striæ appear generally in the second half of pregnancy, often only after its termination, and they also result from any disease which is accompanied by distension of the abdomen. The same striæ, although less frequently, are also found on the skin of the thighs, of the thorax, of the lower limbs, of the buttocks even, and they never disappear entirely, although after some years they become smaller and paler, so that it is often very difficult to detect them. It is justifiable and important to judge of the age of the striæ from their appearance.

The further changes in the anterior abdominal wall to be noted are: Abnormal coloration, exanthematous eruptions, the result, generally, of scratching or of the application of medicinal agents, abscesses, herniæ, diastases, tumors, abnormal development of the blood-vessels (the caput medusæ), and the changes in the linea alba. Separation of the recti abdominis and their tendons are frequently seen, as also great forward projection in the lumbar region, and those changes in position which occur in the sternum and in the lower ribs, as the result of great abdominal distension. Finally, by inspection are determined those movements which are due to peristalsis or to the presence of a fœtus, the pulsation of the abdominal aorta and the respiratory act.

CHAPTER V.

ABDOMINAL PALPATION.

EXTERNAL palpation is best performed with the patient in the dorsal position, and the thighs close together, marked inclination of or elevation of the trunk to the half-sitting posture interfering with the procedure by diminution of the field of palpation. Other positions, such as the erect, the lateral and the knee-elbow, may only be utilized for special purposes, as where we wish to inform ourselves in regard to the influence of change of position, on tumors, fluid, etc.

The bladder and the rectum must be emptied, and the clothing loosened before resort to palpation. In order to avoid unnecessary exposure, the clothing should be loosened from around the hips and pushed down well until the symphysis is exposed, and since it is essential for careful palpation that the hand should rest on the naked skin, the chemise should be tucked up around the thorax and the abdomen laid bare.

The examiner stands to one side of the patient, and places his previously warmed hands, the nails of which have been cut, flat on the abdominal walls, so that the pulp of the fingers may feel the part which is to be palpated. To examine the upper portion of the abdomen, the tips of the fingers are directed towards the ribs; at the lower portion they are pressed down into the pelvis. Under favorable circumstances, and in women who are not too fat and who have borne children, we may easily feel the posterior part of the pelvis, the projecting vertebræ, which the inexperienced may take for a tumor, the aorta and its bifurcation, the linea innominata partially covered by the psoas muscle, and the promontory of the sacrum. Thick layers of fat in the abdominal walls, or contraction of the abdominal muscles or hyperesthesia from pain, will largely prevent palpation or render it impossible. If the hands are placed gently on the abdomen, and no sudden pressure made, it is often possible by gradual depression, to penetrate deeply into the pelvis, particularly when we endeavor to distract the woman's attention by conversing with her, and watching our opportunity for deeper palpation. The direction often given to open the mouth does not amount to much, unless the woman at the same time breathe quietly. In case of exaggerated contraction of the abdominal walls, we may succeed in palpating to a degree during sudden change of position, when there are moments of relaxation, or else we may before palpation fill the bladder and the rectum with water (Hegar and Kaltenbach), on the emptying of which organs the abdomen often becomes very soft and palpable, as also happens when the greatly distended bladder is emptied by the catheter immediately before the examination. In many instances chloroform must be administered. The obstacle offered by great sensitiveness of the abdominal walls is only overcome by care and patience. Hyperesthesia of the abdomen is characterized by the fact that gentle pressure is painful, and that this pain becomes lessened on greater pressure. Inflammatory affections of the pelvic organs, however, forbid every attempt at deep palpation, which causes increase in the pain and also reflex contractions of the abdominal walls. Energetic or rough pressure may intensify an inflammatory affection, rupture or stretch recent adhesions, or encapsulated exudations, hematomata, thin-walled cysts, etc.

In palpating it is well to follow a systematic order, beginning below and proceeding up to the ribs; then reversing the fingers and manipulating from above downwards; finally to the right and to the left of the median line. Where it is a question of tumors of the spleen or of the kidneys, palpation should also be practised in the lateral position. Tumors in the left side will best be felt with the patient lying on her right, and *vice versâ*. By means of palpation we also determine the consistency of the skin (edema), and the state of the umbilicus, inguinal and femoral canals, and the lymph glands in the neighborhood.

In connection with inspection and mensuration, we are able to determine the condition of the skin of the abdomen and its neighborhood, its thickness, the amount of distension, the nature and the manner of the distension. Furthermore, palpation is of especial value in the diagnosis of tumors of the abdomen, in particular of those which lie in the pelvic excavation, and belong to the genital system. Tumors of the abdomen are readily simulated by distension of the bladder and of the intestines, and also by total or partial contraction of the recti or pyriform muscles.

The distended bladder is recognized by its median position, being a fluctuating spherical tumor of not infrequently surprising dimensions, and it may be mistaken for tumors or the gravid uterus. The catheter will, of course, clear the diagnosis. Fæcal masses are ordinarily cylindrical, are not sensitive to pressure, are more or less movable, of moderate consistency, may sometimes be flattened out by the finger, and disappear on evacuation of the bowels. Tumors of the anterior abdominal walls move with them, and may be lifted up with them. All tumors underneath the recti, whether extra- or intra-peritoneal, become indistinct when the abdominal walls contract. In case of diastasis of the recti it is often possible to penetrate between them and to palpate the posterior surface of the tumors. Palpation must still determine in which of the abdominal layers the tumor lies. Its connection with the skin will be recognized by the inability to lift a fold from it. It is often difficult, however, in case of large tumors, fibroids for instance, which proceed from the rectus or its sheath, to decide in regard to their extra-peritoneal seat.

Intra-peritoneal organs and tumors are under the influence of the respiratory movements of the diaphragm. Any organ resting against it moves downward and upward synchronously with it, provided it is not fixed by adhesions. This movability will, of course, be limited or not be present whenever this organ or a tumor attached to it is, on account of its size, incarcerated in the pelvis, or resting against it. Those organs which move markedly during respiration, are the liver, the spleen, the stomach, and in part the intestines; all the other intra-peritoneal organs move under the influence of the above, in particular the intestines, and change their position less freely, and this applies especially to tumors of the pelvic organs, except where from their size they are brought directly under the influence of the motor factors. These isochronous respiratory movements are readily appreciated by the hand, and under favorable circumstances by the eye. Those tumors which lie outside and under the peritoneum, the extra- and retro-peritoneal tumors, move in the above manner only when they project markedly into the peritoneal cavity, in which case they are frequently pediculated from the peritoneum, as, for instance, floating kidneys, long-pedicled ovarian cysts, subserous myomata, etc. Other retro-peritoneal tumors, and also the uterus, do not move with the respiratory act; those growths which have their site in the posterior part of the pelvis, only reach the anterior abdominal wall when they are large, and they are then under the same influences as the intra-peritoneal growths. When they are of less size they do not project much anteriorly, they are covered by the intestines, and they only move slightly under the influence of deep inspiration. Such tumors, therefore, are less palpable. They are influenced more particularly by the intestines, and it is essential to differentiate them from ovarian tumors and kidneys.

The site of the tumor often gives us information in regard to its origin. All tumors belonging to the genital system grow upwards, and are more or less conical at their upper end. The uterus enlarged by pregnancy, sub-involution, metritis, by fluid contents or by tumor, lies in the median line of the body, provided that the tumors do not make it asymmetrical, or that it is not deviated by other tumors or by adhesions, while, on the other hand, tumors of the uterine adnexa and those resulting from developmental anomalies of the uterus, have their site at the outset to one side of the mid-line, and only attain this with increase in size.

Palpation also aims at determining the shape and condition of the surface of a tumor, as also the consistency, whether hard, elastic or fluctuating. Alterations in consistency are of importance from a diagnostic standpoint. If on palpation we feel that the tumor is especially hard in one portion and soft in another, whereby change in shape is caused, then we are justified in thinking that there is contractile substance in the growth. As for density, it varies from a softness which almost escapes recognition, as in case of slightly filled cysts, up to the highest grade of hardness, as in case of many fibroid tumors, lithopädions, etc. The determination of the consistency is often difficult, owing to the state of the abdominal walls or the deep situation of the growth. This difficulty is in part overcome by change in position, or else through resort to the conjoined examination, whereby at least a portion of the growth may be brought between the hands. An essential diagnostic point is the presence or the absence of fluctuation. By this term is understood the faint impulse communicated to the fingers on pressure on the tumor between the hands. According to the nature and rapidity of this impulse, we may often decide as to the consistency of the fluid in the tumor and the construction of its interior. Thus in case of large ovarian cysts the nature of the impulse will point to the presence or absence of septa, as also to the quality of the contained fluid. Since all large intra-peritoneal cysts rest on the abdominal aorta, we may detect the arterial impulse through the medium of the cyst fluid, while this impulse has no influence on free fluid in the abdominal cavity, since it is broken by the intestines. The determination of fluctuation is less certain or not at all so when one hand is used, or when both are too close together.

Certainty as to the existence of fluctuation is often not obtainable. Even the most practised examiner is often not able to be sure as to the presence of fluid. Very soft tumors, as, for instance, certain myomata, give this identical sensation, and, on the other hand, very tense cysts may not fluctuate at all. Again deep-lying, slightly filled cysts, may give no sensation of fluctuation, and many examiners are led into error in regard to the presence of the impulse wave. Sudden pressure on a tumor containing fluid often gives the impression as of a contained body, of ballottement in other words; and we would refer here also to the peculiar tremor which characterizes echinococcus cysts, to which Piorry first called attention, and which has been noticed by others, and is considered to result from rapid and marked fluctuation.

The connection, also, of abdominal tumors with other organs or tumors, may be determined by palpation. Tumors adherent to the abdominal walls either move with it, or are firmly attached to it. The sensation of rubbing, which is also appreciable on auscultation, suggests a roughening of the parietal peritoneum, and also points to the fact that union is not very intimate. The union with deeper organs is determined by lessened movability of the tumors, or motility in connection with them, or may be directly felt by pressing the fingers deeply in between the tumor and the organ, finding out whether it is possible to separate them. In case we are unable to penetrate deeply enough to press on the tumor, in which event we suspect bands or adhesions, then we may, as Schultze suggests, cause the tumor to be pulled down or lifted up by an assistant. By means of changes in the position of the patient, also, we may often be able to determine important points in regard to the origin and connections of a tumor, and, as Spencer Wells has pointed out, non-adherent tumors gravitate out of the pelvis on the assumption of the knee-elbow position.

In order to determine the degree of tenderness, we first make gentle, then greater, slower and then quicker pressure, also during effort or cough on the part of the patient. The region of the cæcum, as also the neighborhood of the vertebral column, where the nerve filaments accompanying the aorta are, is generally somewhat sensitive.

CHAPTER VI.

PERCUSSION OF THE ABDOMEN.

PERCUSSION is ordinarily practised with the patient in the dorsal position, since in the erect posture the abdominal walls are so tense that the note is especially dull. It will often be necessary, however, as in case of the presence of free fluid in the abdominal cavity, to use the lateral or the knee-elbow (Schönlein) position. It is best to percuss with the finger against the exposed skin, either through the medium of a pleximeter or directly on the finger, the latter having the advantage that during percussion we also obtain information in regard to local consistency, which may have escaped the examiner during palpation.

The results obtainable from abdominal percussion are far inferior to those from the thoracic, since the condition of the intestine, as regards contained air and ingesta, differs, and hence the normal percussion tone; and since the individual organs vary in position, according to the length of their mesentery, and also since they readily change in position, we are often unable to determine with certainty such position. In addition we lack the ability of comparing the note on corresponding sides, which assists us so much in detecting slight alterations in case of thoracic percussion.

Percussion of the abdomen affords exact information in regard to the position of all the viscera. A common fault of the examiner is that percussion is made too forcibly, whereby he is likely to overlook slight dullness. Changes in the percussion note, however, are of value, in that we thus obtain information in regard to the thickness of the tissues. Differences in the pressure, also, of the finger or pleximeter give varying results, for when we press in deeply, we push the coils of intestine to one side, and obtain on percussion the dullness below them, which on gentle pressure would not have been noted.

We need not emphasize the fact that before resorting to percussion, the bladder and the rectum should be emptied. It is best also to percuss after a regular order, as, for instance, from the ensiform cartilage down to the symphysis, then in the mamillary and in the axillary line, next from the umbilicus transversely to the right and the left into the lumbar regions.

Since abdominal palpation gives, in general, much more certain information, percussion is generally only of value in determining as to whether intestine lies above the examined object or not, and it can only answer this purpose where the intestine contains gas. Mader has resuscitated the old method of filling the intestine with water or gas, even as Rosenbach administers seidlitz powder before examining the region of the stomach. Further, percussion is an adjuvant to palpation, in cases where the latter cannot be satisfactorily resorted to, as in case of great tension or hyperesthesia of the abdomen, or when an abdominal tumor is so soft as to escape palpation, or when the tumor is so large as to reach to the ribs, where its upper border is beyond the reach of the palpating hand.

The intestine distended by gas may be recognized by percussion, and we thus possess a means of determining the relation of the intestine to tumor, or to fluid in the abdomen. We are thus able to differentiate tumors one from another, and from connection with the liver or spleen, by the tympanitic note which percussion of the intestine lying between them gives. In case there is present free fluid in the peritoneal cavity, it always seeks the lowest point unless it be encapsulated or adhesions interfere with its free movement. The intestine distended by gas floats on top of the fluid, and when the patient occupies the dorsal position, it lies against the anterior abdominal wall in the neighborhood of the umbilicus, provided, of course, that the mesentery permits. When the patient alters her position, the fluid still gravitates downwards, and the intestines rise upwards. In case of ascites then, the patient being in the dorsal position, we will obtain tympanitic resonance in the centre of the abdomen, and dullness in both lumbar regions. When the patient lies on her right side, the note will be dull there and tympanitic on the left. The results of percussion are here very precious, when we have to differentiate between free fluid in the abdominal cavity, and a tumor containing fluid. We may fall into error, however, in case there be no gas in the intestine or it be not empty. When the intestines are distended by fluids or by solids, they no longer float on the fluid, but being heavy they sink to the lowest point.

In case an ovarian cyst occupies the middle of the abdomen, close to the anterior abdominal wall, tympanitic resonance will be detected on both sides. Still there are many conditions which may alter this. In case there are adhesions which divide up the abdominal cavity, or if the ascitic fluid is encapsulated, then, of course, the characteristic alterations in position will be wanting. The same holds true of shortening of the mesentery, as frequently happens in chronic peritonitis, when the intestine cannot, in consequence, reach the anterior abdominal wall, and, therefore, at the highest point of the abdomen there is dullness. By deep pressure on the pleximeter, however, as Peter Frank pointed out, we may displace the fluid and obtain a tympanitic note. Small quantities of fluid may escape recognition if the patients lie with flexed thighs, for then the fluid flows down into the pelvis; we had better, therefore, percuss in the dorsal position with the nates elevated, or else in the knee-chest position. Excessive amounts of fluid are not characterized by alteration in level on change in position.

In case ascitic fluid in small amount is present in the abdominal cavity, loops of intestine may gravitate to the lateral regions, and give a tympanitic note in the presence of fluctuation, while in case of cystic tumors the note is dull in the presence of fluctuation. This is a valuable diagnostic point which we owe to Spencer Wells.

CHAPTER VII.

MENSURATION OF THE ABDOMEN.

ASIDE from obstetric measurements of the pelvis, it is important in connection with certain gynecological topics to determine the form of the pelvis. The external measurements may be obtained by means of a pelvimeter, and a measuring tape in the ordinary way. Mensuration, however, is especially important for noting the rapidity and manner of growth of the abdominal tumors. It goes without saying that the results of each measurement must be recorded, for it is impossible from only one to two measurements to judge of the behavior of organs which change constantly in position and in size, as well as in their integumentary covering. The larger the tumor in the abdomen, the less in general will be the error in measurement from great compression of the intestines, and from thinning out of the abdominal parietes. It is also self-evident that exact measurements are only obtainable in case of a certain degree of convexity of the abdomen, since otherwise the tape cannot be uniformly approximated.

For purposes of mensuration an inelastic tape, of linen or leather, divided into centimeters, should be used. The most important measurements are: the circumference of the abdomen at the umbilicus, the greatest circumference, the distance from the umbilicus to the symphysis and the ensiform cartilage, the distance of the umbilicus and the margin of the greatest circumference from the anterior superior spinous processes of the ilium of either side, possibly to the middle of Poupart's ligament, and finally the distance of one spinous process of the spinal column from the linea alba. The measurements should be made along the uncovered body in the standing posture, or better still in the recumbent, and the tape should be applied at each measurement along the same part of the body. A much more exact idea of the shape of the abdomen may be obtained by means of a kyrtometer, or else by using a malleable metal band, which may be moulded closely to the abdominal wall, and retains its shape.

CHAPTER VIII.

AUSCULTATION OF THE ABDOMEN.

THE auscultatory signs obtained over the gravid uterus are of the utmost importance in diagnosis. Such are the sounds of the fœtal heart, which in the second half of pregnancy are readily recognizable by their frequency, double beat, and the fact that they are not synchronous with the rhythm of the mother's heart; further the umbilical souffle, which is not infrequently mistaken for the second sound of the fœtal heart, but which is a certain sign of pregnancy, and finally every sound which accompanies the movements of the fœtus. Aside from pregnancy sounds are also heard, such as: the maternal heart beat, the pulsation of the abdominal aorta, sounds due to passage of flatus through the intestines, to the mixture of ascitic fluid and air, and finally the sound resulting from the rubbing together of raw surfaces.

Auscultation is practised with the patient in the dorsal position, with the thighs slightly approximated—marked flexion of the thighs interferes with the examination—and her body elevated enough not to cause the examiner to bend over too much. Auscultation may be direct by the ear against the abdomen covered by a towel, or else, and this is preferable, by means of a stethoscope. The instruments devised for vaginal auscultation are rarely useful. We must be careful to apply the stethoscope evenly to the abdominal walls, and not to press on it overmuch, else faint murmurs may be overlooked.

Auscultation of the abdominal organs is practised too little, and yet it affords us most valuable information. The most important of the auscultatory sounds, the so-called placental souffle—which is considered by many, Naegele in particular, to be characteristic of pregnancy—is a more or less loud rhythmical murmur, synchronous with the maternal pulse, and is heard not only during pregnancy, but also in case of the large majority of abdominal tumors. According to Winckel and to Spencer Wells it is heard over fully one-half of the solid tumors of the uterus, and much less frequently over ovarian cysts; still Winckel recognized it in a case of cyst of the ovary adherent to the omentum. A similar murmur has also been heard over the spleen (Winckel, Birch-Hirschfeld), over retro-peritoneal tumors (Winckel), and latterly over a carcinoma of the liver (Leopold). It has never as yet been heard over tumors of the kidney. Since, however, this murmur is not constant, and since its absence is not specially important, its diagnostic value is not very great. There is difference of opinion in regard to the cause of this murmur. The researches of Veit, Martin, Pernice, Winckel, and others, have fairly well established the fact that the source of the murmur is in the arteries, although the mechanism of its production has not as yet been proved. Furthermore, the nature of the murmur, its systolic increase, and frequently its continuous buzzing character, and its presence over localities where there are no large arteries, make it likely that it may also be produced in distended capillaries (Leopold).

It is often important to determine whether the murmur is over the tumor itself or in its neighborhood. Changes in position of the patient or of the tumor give us information on this point, as also compression of the vessel above the site of auscultation. Any murmur which arises in the pelvic arteries follows their course, while a murmur in the tumor is generally spread over a wide surface. The maternal heart-beat and the pulse in the abdominal aorta, which is often to be seen and to be felt, should not be confounded with the above murmur. The question as to whether a murmur is isochronous or not with the maternal pulse, is decided by comparing it with the pulsation of the radial artery.

The gurgling murmurs which accompany the presence of gas and of fluid in the intestine, as also the so-called succussion murmur, are of special diagnostic value, and in addition the rubbing, creaking sounds which point to roughening of the parietal peritoneum, and of the organs lying in contact with it.

CHAPTER IX.

THE DIGITAL EXAMINATION OF THE INTERNAL PELVIC ORGANS.

THE concealed position of the essential organs of generation makes it necessary to utilize one of the three openings into the pelvis for their examination. Hippocrates, Soranus, Aretaeus and others used and taught one of these methods, the exploration by the vagina, and this method remained the sole one used up to the end of the last century. The anal and the urethral openings were also used for purposes of manual and of instrumental exploration, but only surgically for the removal of foreign bodies from the rectum and the bladder. A new era, as Schroeder says, was inaugurated in gynecology when the examination by the finger, previously utilized only for vaginal touch, was combined with the use of the other hand externally, whereby the pelvic organs are so steadied and depressed that hereby alone the greatest certainty in diagnosis is attainable. This method which had been used obstetrically one hundred years previously by Puzos, and later in obscure cases of pregnancy by Baudelocque, Joerg, Schmitt, and others, lapsed into neglect, until about forty years ago, when it was resuscitated by Busch and Kiwisch, and placed on a firm basis by them and by B. S. Schultze, Holst, Veit, Schroeder, Sims, Hegar and Kaltenbach.

While the simple vaginal touch only informs us in regard to the cervix, and in an incomplete way in regard to the body of the uterus and its adnexa, the most important conditions of the pelvic organs are unexplained, and therefore it is difficult to understand why the combined examination is not correctly practised by all physicians, and why in even modern text-books on gynecology, the subject is superficially considered. And yet it is the sole method by means of which the shape, movability, consistency, connections, tenderness, size of all the pelvic organs, may be determined, which often makes the use of instruments, in particular the sound, possible, and which cannot be displaced by any other method of examination.

According to the opening used for examination, we differentiate between the vaginal, the rectal and the vesical touch. Each one of these methods of examination is assisted by the use of the other hand, which is placed on the abdomen, and brings the organs nearer the examining finger; in other words the examination is a combined one, or, as Sims has termed it, a bimanual. In addition then to simple vaginal touch, we have the combined vaginal, the most frequent, and the combined rectal and vesical touch. As a further means of assistance in these methods, we must mention artificial prolapse of the uterus and dilatation of the cavity of this organ, for which procedures the vagina is also utilized.

In addition to the above methods of examination, we may resort to a further method which is from two of the passages at the same time, as, for instance, by the vagina and the rectum, by the vagina and the bladder, by the bladder and the rectum. Each of these methods may be performed by means of two or more fingers of one hand, or by means of one or more fingers of both hands, or by the help of instruments, as, for example, a catheter in the bladder. Further combinations of these methods may finally be made, as from the vagina and rectum and abdomen, or else from the vagina, rectum, bladder and abdomen, where, of course, the help of an assistant is always necessary.

Almost all the pelvic organs, according to circumstances, may be examined from either of the three passages, although not with the same results and ease. In general, the direction may be given to use that passage which leads most directly to the object to be examined, and by the shortest route, and secondly by that which enables us to feel the organ with the least opposition. The most usual method is the combined vaginal and abdominal, by which, unquestionably, the most exact information is obtainable. All those parts, however, which lie above the insertion of the posterior vaginal wall, and which are in the posterior portion of the pelvis, may be examined at least as well, and occasionally even more easily and more directly on account of the lessened thickness of the intervening tissue layers, from the rectum combined with abdominal palpation.

Bodies which lie in the anterior fornix, between the bladder and the uterus, on the anterior uterine wall, and the broad ligaments and tubes, may be felt to the best advantage through the bladder; still this manner of examination is inconvenient, and is attended by certain risks, so that except in rare instances we had better be satisfied with the slightly less exact results of the combined vaginal examination. The recto-vaginal and the urethro-vaginal septum, and tumors which lie deeply between the bladder and the uterus, or the uterus and the rectum, may be carefully examined by inserting in the first instance a finger of one hand into the rectum, and the thumb of the same hand or a finger of the other into the vagina, the combined recto-vaginal examination; and in the second instance the finger of one hand is inserted into the urethra or the bladder, and that of the other hand into the vagina, the combined urethro- or vesico-vaginal examination. In case of atresia vaginæ, we may examine by the rectum and the bladder, as also in case of congenital faults in development of the vagina and the uterus, of abnormalities in the course of the ureters, in case of tumors which occupy the wall of the uterus or to one side of the organ, and which have their origin in some developmental anomaly.

Before resorting to a digital examination, the hand should be most carefully washed, after the manner described further on, and the vulva and the vestibule are to be inspected, exposing the patient as little as possible. Examination under cover carries with it the danger of infection. In case of suspicion of an infectious discharge, or in case of profuse leucorrhœa, the vagina should first be douched with lukewarm water. Frequently the patient has been subjected to treatment by astringents or caustics, which have changed the appearance of the parts in one way or another; so that unless we are careful to inform ourselves carefully in regard to the case before resorting to examination, we may easily draw false conclusions.

The vaginal examination may ordinarily be made by the index finger alone, although frequently, in case of the combined examination, two fingers are introduced. Madame Boivin's opinion that by two fingers the examination is more perfect, and that we may reach higher in the pelvis, is questionable. Only in case of very wide introitus vaginæ, is the insertion of two or more fingers necessary. The more expert the examiner the less will he ever need to use two fingers, and the inexpert will often not feel anything even with two. If the thumb is abducted so that it forms an angle of about 110° with the index, and if the other fingers are sharply flexed in the hand, then it is possible by means of strong downward pressure on the perineum, to reach into the pelvis one to one and a half inches deeper than the length of the finger, from the tip to the metacarpo-phalangeal joint.

I. The Vaginal Examination.

a. *The simple Vaginal Examination.*—The vaginal examination necessitates patulousness of the canal, or at least of the ostium. Generally the patency will be interfered with by the presence of the hymen. An imperforate hymen, like any other closure of the ostium vaginæ or of the canal itself, constitutes an absolute obstacle which must be overcome by surgical means. The same holds true of abnormalities of the hymen, as, for instance, the cribriform hymen, and of congenital or acquired narrowings of the vagina or of its introitus, which do not allow of the insertion of the finger into the lumen of the genital canal. Here a cutting or forcible dilatation must precede the vaginal touch. The normal hymen rarely constitutes much of an obstacle to the touch. Naturally, examination of young girls must be limited strictly to exceptional cases, but it must not be neglected in cases of necessity, on the ground that it is difficult. Ordinarily the hymeneal opening may be distended sufficiently by the well-anointed and carefully inserted finger, without inflicting great pain, especially if we follow Elischer's advice, and tell the patient to bear down strongly during the examination. The recommendation of certain gynecologists to examine with the little finger, is of no utility and productive of insufficient results. Besides, chloroform is useful, and it should be administered in face of the psychical and physical results of the examination. In case the hymen is crescentic and open above, by pressing up the bulb of the urethra sufficient space is readily obtained without pressure on the sensitive hymeneal border. In case it is impossible to insert the finger, as often happens in more mature girls, then it is better to knick the hymen in a number of places than to tear it violently.

The examination of the hymen is important from a medico-legal standpoint. It is, as is readily understood, a very difficult matter in the majority of cases, or rather impossible, to deduce a conclusion in regard to virginity from the appearance of the genital organs, and the law is satisfied with data in regard to penetration, and on this point the hymeneal edges give the most important evidence, although not sufficient for all cases. Since, in order to answer this question, it is especially important to examine the free border of the hymen for the absence or the presence of tears or cicatrices, it is necessary to stretch the hymen equally as much as possible. The patient should be placed in the dorsal position, with the buttocks elevated, the thighs abducted and flexed, the labia majora and minora pulled apart; and we endeavor by equable traction, or by pressing out the hymen by a sound inserted in its orifice, or by a catheter in the bladder to obtain a good view. Often this procedure is difficult, not only from the resistance of the patient, but because of the deep site of the hymen, which is often the case in women who are examined from a medico-legal point of view, since repeated attempts at intromission may in case of resistant hymen push it in a considerable distance from its normal site. In case the hymeneal edges are fimbriated, etc., it is obvious what a difficult matter it is to reach an opinion, the more so from the fact that the physician must be careful not to cause a rupture himself which, as has happened, would lead to an erroneous opinion. In these instances, a rubber bag is very useful, for it may be inserted collapsed, and in distension the hymen lies against it, and we may examine its edges without fear of rupture.

Similar obstacles are offered by narrowness of the introitus vaginæ, by recent marriage, and the presence of the inflammatory and nervous forms of vaginismus. In these instances resort to chloroform is useful, although much may be accomplished by the use of baths, the local application of narcotics, etc.

Tumors of the external genitals and of the vagina, such as cysts and fibromata, further, large tumors of the uterus and its annexes, or of the bony pelvis, where they involve the lumen of the vagina, may interfere with examination. As further obstacles may be enumerated, acquired atresia of the vagina, congenital or acquired narrowness, exudations in the neighborhood. Acute inflammatory processes hinder the vaginal touch, on account of the pain involved.

The simple vaginal examination may be made with the patient in the dorsal or lateral or erect position. Other positions are less frequently used. Since the bimanual examination should ever follow the simple touch, the dorsal position, certainly in Germany, is most commonly used, while the English and Americans use by preference the left lateral position. [Far from this being the case, gynecologists of no nationality whatsoever more sharply differentiate the value of the two positions, the dorsal and the lateral, for purposes of the digital examination than the Americans. It is uniformly conceded in this country, that the only position proper for careful digital exploration and the bimanual is the dorsal, while almost all gynecologists of experience use the lateral position, or Sims', for the specular examination and the treatment of the cervix and the uterus.—ED.]

To examine in the dorsal position, the bladder and rectum are emptied, although in case of deviation of the uterus, it may be necessary to examine while the bladder is full, and the patient lies on the examining table, with the buttocks elevated above the level of the table and near its edge, so that the elbow of the examiner may be depressed sufficiently. The knees are flexed and the thighs rotated outwards as much as possible. The clothing should be loosened or removed, and a sheet should be thrown over the patient.

The examiner should be able to use either hand. For exploration of the uterus that hand is chosen which corresponds to the side of the patient on which the examiner stands; for examination of the lateral fornices the opposite hand, and for the pelvic walls the corresponding hand is used. Thus if the examiner stands on the left of his patient, with his left hand he feels, besides the uterus, the right parametrium and the left wall of the pelvis, with the ovary, but the exploration of the left parametrium and of the right wall of the pelvis is best secured through the right hand. Change in the hand, of course, necessitates change in the position.

The finger well anointed with oil, vaseline or glycerine, is carried over the posterior commissure into the vagina, touching the vulva as little as possible. Frequently the labia must be separated by the other hand, in order to put the commissure on the stretch.

When the finger has been inserted it is extended with its radial border upwards. The thumb is placed to one side of the clitoris and pressed against the pubes, and the remaining fingers are flexed in the palm of the hand, depressing the perineum as much as possible. The forearm must be brought approximately into the same plane as the examining finger, and the higher we wish to penetrate into the pelvis the more we must depress the elbow, and the pelvis itself may even have to be elevated. For the rapid detection of lateral deviations of the uterus and abnormalities of the bony pelvis, it is of great advantage if the examining finger, the hand, and the forearm, are held in a line coincident with that of the middle of the patient's body, that is to say, so that the elbow, the wrist, the tip of the examining finger, the symphysis, the umbilicus, and the ensiform cartilage of the patient are in the same axis.

In the lateral position, where one thigh is flexed more strongly than the other against the thorax, we may examine with either hand from either side. In the left lateral position, when the finger has been inserted, the thumb also rests against the symphysis, and the remaining fingers against the perineum; but we can examine with the right hand as well, and then the thumb will lie on the perineum and the three remaining fingers against the symphysis, a position which the partisans of this method of examination greatly favor. Yet it is far easier to avoid touching the clitoris and the urethra, the sensitive parts in the anterior commissure, by the more movable thumb, than by the less movable middle finger. In this position the anterior surface of the uterus and the posterior wall of the pelvis are examined to the best advantage with the right hand, and the posterior surface of the uterus and the anterior wall of the pelvis with the left hand; the lateral surfaces of the uterus may be examined with either hand.

This position and the knee-elbow are especially to be used where it is advisable to examine in the absence of abdominal pressure, when the uterus sinks deeper against the pelvic outlet, becomes more movable, gravitates away from its vaginal insertion, and when, therefore, the connection of the organ with pelvic tumors may the better be determined.

In the upright position the movable pelvic organs sink somewhat deeper, and it is, therefore, easier to reach higher beyond the uterus. This advantage, however, is offset by the impossibility of depressing the soft parts of the pelvic floor, as in the other positions, and by the fact that the increased intra-abdominal pressure markedly lessens the movability of the uterus. Notwithstanding these objections, this position will often be utilized for examination whenever we are anxious to gain rapid information in regard to the condition of the pelvic organs, the influence of abdominal pressure on them, and on the displacements of the uterus. In order to examine in this position, the woman stands upright before the examiner, with feet somewhat apart, the examiner rests on one knee and inserts the finger of the hand of the same side into the vagina, the thumb resting in the anterior commissure, and the remaining fingers against the perineum.

To properly practise the simple vaginal touch, we must avoid every measure which might effect change in the position of the examined parts; thus we must be careful not to make pressure on the abdomen, and we should examine in such an order as will leave to the last any manipulation which moves the genital organs.

Before the finger is inserted into the vagina, we must inform ourselves in regard to the condition of the external genital organs, their size, consistency, tenderness, the state of the perineum and the posterior commissure, as regards integrity, the labia minora, meatus urethræ, and the clitoris, although we must not touch the latter organ overmuch. The position of the introitus vaginæ gives us information in regard to the inclination of the pelvis. In the vestibule we must note, the hymen, the myrtiform caruncles, the state of the vulvo-vaginal glands, the condition of the bulb of the urethra, and of the anterior or the posterior vaginal wall, as regards sagging, and lastly we must look for tumors or errors in development. It may happen that in case of double vagina, this may be overlooked if inspection is not resorted to, but simply the finger introduced.

When the finger is in the vagina it must take account of the direction, length, width, temperature, moisture of the canal, and must examine the posterior and the anterior walls as regards smoothness, distensibility, rugosity. On the anterior wall we feel the posterior wall of the urethra, the entrance of the ureters, the anterior portion of the levator ani, the anterior surface of the pelvis, and on the posterior vaginal wall we feel the recto-vaginal septum and the posterior wall of the rectum. We must further take note of the capacity of the pelvic outlet, the distance between the tuberosities of the ischium, the condition of the sacro-spinous and the utero-sacral ligaments, the anterior surface of the lower part of the sacrum, the shape, direction, movability, tenderness of the coccyx. When the finger has penetrated three-quarters of the way into the vagina, it reaches the vaginal portion of the cervix, which forms a more or less long and conical projection into the lumen of the canal. The essential point about the cervix is the external os, which divides it into an anterior and a posterior lip, and is round or transversely oval in the nullipara, elliptical and transversely slit, in general, in women who have borne children, and with irregular edges. The size and the condition of the os, its smoothness or roughness, tumors within it or in its immediate neighborhood (nabothian follicles, mucous polyps, etc.), the shape, direction, length of the cervix, its consistency and that of its mucous membrane, the tenderness on pressure, are points which may be determined very rapidly. We next carry the finger around the cervix and examine the fornices in regard to the same points as the vagina, and also for pulsation, depth, and the insertion of the cervix. In all positions where positive abdominal pressure acts, the uterus sinks somewhat into the vagina and the determination of its insertion is only approximate. In any position where the abdominal pressure is negative, or when the uterus is raised upward by pressure on the cervix, the organ is carried away from the pelvic floor, the sagging vaginal walls stretch out, and their insertion may be determined with exactness. Through the vaginal *cul-de-sac* we may feel the pelvic inlet. In case there is detected a tumor or increased resistance, we must note the size, form, condition of the surface, consistency, tenderness, and the relation to the cervix. We may also feel, under favorable conditions, the supra-vaginal portion of the cervix, a portion of the body of the uterus, and the sacro-uterine ligaments. The borders and the consistency of the cervix are above all to be carefully noted.

Whenever a tumor is felt in the vaginal vault, we must at the outset decide as to whether it is the body of the uterus or not, and as to the relations it has to the cervix. The exact continuity of the object with the cervix, the simultaneous movability of the two, the shape, are generally not sufficient for diagnosis. In such cases we endeavor to penetrate with the finger as far as possible between the uterus and the supposed tumor, and thus to establish the separation. Only very exceptionally is it possible to detect with the unaided finger the tubes and the ovaries, the latter, under normal conditions, being almond-shaped, rather hard, easily movable bodies.

The simple vaginal touch is of unquestionable value in the determination of the form and displacement of the uterus, since the parts are uninterfered with by external manipulation, but it cannot always carry the weight of certainty in diagnosis.

After having obtained the above data, we test the movability of the organs which are to be felt by the vagina, in particular the uterus. The cervix is pushed upwards, to the right and left, forwards and backwards, and we note whether the body moves with it, and if after such movements the uterus returns to its former position. We thus obtain information in regard to the length of the ligaments, their relaxation, the existence of remnants of parametric or perimetric exudation, which is often evidenced by thickened bands, and further still we note the weight of the uterus, the position and connection of the organ with others, the presence of ascitic fluid in the abdominal cavity, and finally the sensibility of the uterus and the pelvic surroundings.

After concluding the examination the finger is withdrawn and the secretion, etc., on it is looked at.

b. *The combined Vaginal Examination.*—For the proper performance of this method of examination not only must the vagina be patent for the finger, but its walls must be thin and distensible, especially in the *cul-de-sac.* A short vagina with tense thick walls, or one where, as the result of the presence of tumors, or of inflammatory affections, there exists limited distensibility, interferes with or prohibits this manner of examination. By means of methods to be spoken of later, this tenseness may frequently be diminished, but again often this is not possible. As contra-indications to the method may be mentioned, recent inflammations of the uterus, its adnexa, the pelvic peritoneum and cellular tissue, hematocele, pyosalpinx, hematometra, hematosalpinx, thin-walled cysts of the ovary and ligaments, for the reason that much manipulation may increase the inflammatory trouble, or else cause rupture. Large tumors filling the pelvis, if they cannot be pushed above it, render the bimanual palpation almost or entirely nugatory. A further factor which interferes is the inability to palpate. Not only must the vagina allow of the penetration of the finger, but we must be able to depress the abdominal walls. Great deposits of fat in the abdominal walls or in the mesentery, the pendulous abdomen, painful inflammatory affections of the abdominal walls, these interfere greatly with or prevent the performance of the bimanual palpation. Much distension of the bladder and rectum must of course, be relieved. This examination will also be very difficult to perform in cases where there is excessive deposit of fat in the thighs, nates, or external genitals, whereby the vagina is longer and the parts to be palpated are higher up. The means which we noted under palpation, for rendering it easier of performance, are also applicable here, and in case of necessity, we may resort to anesthetization.

In order to perform the bimanual, we choose a position whence both the vaginal touch and palpation may be resorted to at one and the same time. In Germany generally the bimanual palpation is performed with the patient lying in the dorsal position and with flexed thighs, and the simple vaginal touch is followed at once by the bimanual. In this position the abdominal pressure is slight, when the buttocks are elevated it is negative, the movements of each hand are free, and we are able to make considerable pressure on the abdomen. The most ill-adapted position is the upright, and only under very exceptional circumstances, for instance where the abdominal walls are greatly relaxed, is it possible to reach any results. The side and the side-abdominal positions, on the contrary, are often useful, especially when it is desired to determine the relation which the uterus bears to other organs, or tumors, since thus its movability is best tested. In the lateral position it is also possible to penetrate quite deeply into the pelvis, but it is necessary for the upper thigh to be held up by an assistant or by a bolster placed under it, else the play of the palpating hand and its forearm is limited. The knee-elbow position is unsuitable for the bimanual, because the movable internal organs gravitate away from the examining finger, and the palpating hand cannot be used to advantage.

The position of the examiner, the choice of the hand, the introduction of the finger, are similar to what holds for the simple vaginal touch. Indeed the simple touch should be followed at once by the combined, the finger not being withdrawn from the vagina. The hand on the abdomen aims at pressing the movable abdominal organs downwards, and fixing them in such a position that simply the abdominal parietes on the one side, and the vaginal walls on the other, separate them from the fingers of the two hands.

The patient being in the dorsal position, the extended hand is placed on the abdomen, the tips of the fingers being directed towards the ensiform cartilage, and the abdominal walls are depressed. In thin individuals we come at once upon the promontory and the anterior surface of the sacrum. If the uterus be now lifted up on the finger in the vagina, or in case the organ is enlarged, the fundus is readily felt, or in case of anteversion the posterior surface of the organ, and while this is palpated by the external hand, the finger in the vagina examines the vaginal portion of the cervix, and the anterior surface of the body of the uterus.

The fingers of the external hand and the internal finger may be brought together in front, the vaginal wall and the abdominal parietes and the bladder alone interfering, and laterally only the layers of the broad ligament. The uterus may be thrown forwards for more careful palpation, if the internal finger pushes the cervix upwards and backwards. In case the external fingers are placed just over the symphysis and pressure be made deeply into the pelvis, the uterus is pushed downwards and a trifle backwards, and this is to be avoided, for it is preferable to begin by palpation of the posterior portion of the pelvis first, and thence working forwards.

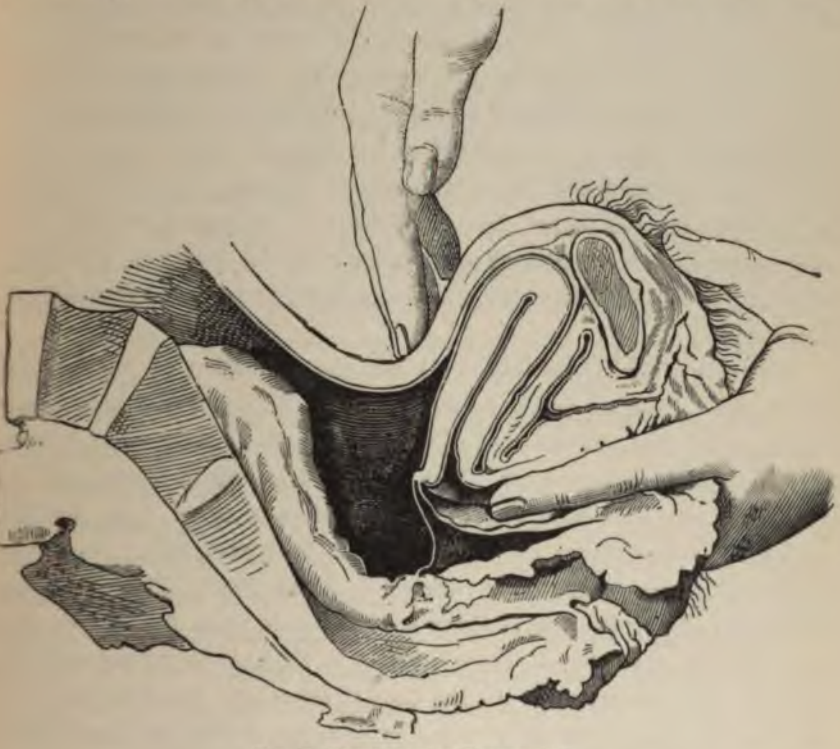

FIG. 10.—THE BIMANUAL EXAMINATION.

In case the conditions are favorable, and by securing proper fixation of the uterus, we may estimate its form and size, the relative size of the cervix and of the body, the curvature of its anterior surface, the thickness, consistency, sensitiveness, as also the presence of even minute tumors of its surface.

We next proceed to determine the movability of the uterus. The internal finger pushes the cervix forwards, while the external hand depresses the fundus towards the hollow of the sacrum, and, if the conditions are favorable, the external hand may examine the anterior surface of the uterus, and determine the necessary points in regard to it.

Since now by these manipulations the uterus is pushed out of position, it is evident that the bimanual palpation cannot alone determine the position of the organ, but that the simple vaginal touch must always precede the bimanual. Where, however, the touch has determined the fact that the cervix is deviated to one or another side, or that in one or another form there is present a tumor or increased resistance, then by the bimanual palpation we may detect the reasons. The absence of the body of the uterus from its normal position, the size, shape, consistency of the questionable tumor, the continuity of the tissues between this tumor and the cervix, give us information as to the condition of affairs, especially in conjunction with what is gained by testing the mobility of the uterus.

There is a similar liability to error in the estimation of the shape of the uterus. Pressure on the organ may cause flexion of the body backwards or forwards on the cervix, and here careful simple vaginal touch is a safeguard against error. The combined examination will tell us the nature of the flexion, the thickness and consistency of the uterine wall, and as to whether the flexion may be overcome, and if so, if the organ will remain straight or resume its flexed form. These facts are noted by pressing the uterus down against the internal finger. In case of anteflexion, the internal finger is placed in the anterior fornix, and the external hand endeavors to lift the body of the uterus upwards, and then the internal finger is transferred to the posterior fornix, and it estimates how much the organ is straightened by the external hand. In a similar manner we may estimate the amount and the behavior of backward and lateral flexions.

The other pelvic organs may be examined even as can the uterus. Generally it is possible to approximate the fingers in the anterior fornix without difficulty, so that they are only separated by the abdominal parietes, the vaginal wall, the bladder and the cellular tissue, and we may detect slight unevenness or tumors with ease. The finger in the vagina directed towards the symphysis may touch the anterior pelvic wall, the round ligaments, the utero-vesical pouch, and the latter all the better the more the external hand is able to move the uterus and to thus put the ligaments on the stretch. It is much more difficult to approximate the fingers in the posterior fornix. This is generally only possible where the abdominal and pelvic walls are relaxed and thin. Under favorable conditions, however, the fingers may meet in the centre of the posterior pelvic space, and may feel the sacro-uterine ligaments which are like tense cords, in case the uterus is pushed greatly downwards or forwards.

The lateral fornices may be similarly examined. We examine first the sides of the uterus, then the broad ligaments and the tubes within them which simulate between the fingers rolling, thin, round cords. Behind and externally the ovaries may be palpated as regards their position, form, size, surfaces, sensibility and motility. Only very exceptionally is it possible to feel the ovarian ligament. We must further in the examination of the lateral regions, determine the mobility of the uterus to one or another side, as also the condition as regards tenseness of the lateral ligaments.

It is in the differential diagnosis of the various pelvic tumors that the bimanual palpation is of the greatest utility. In case these tumors can be reached by the vagina, then we are able, even as in case of the normal pelvic organs, to determine their size, relative position, surface, consistency, movability, etc., but the question of attachment is still left unsettled. The position of the tumor may suggest this, but its connection with the normal organs must be determined. Tumors which occupy the walls of the uterus project more or less beyond the surface of the organ, and appear to be entirely or partially imbedded in its tissues. Growths which are not very intimately connected with the uterus may still be determined as attached to it by the finger pressed down between them and the organ, but they simulate and are to be differentiated from flexions. Motion imparted to the uterus and to the tumor may inform us in regard to the connection, although such information is fallible, the larger the tumor and the nearer and more intimate its connection with the uterus. We may utilize Schultze's method of causing an assistant to draw up the abdominal tumor, and then to study more carefully the relations existing between it and the pelvic organs; but frequently this method is not available, owing to the tension of the abdominal walls. In case it is possible

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by means of the fingers to separate the tumor from the uterus, then the pedicle may be felt, or else a simple projection of the parenchyma of the uterus. In case of large tumors which are not movable, we may not be able to press the fingers down between them and the uterus, but we may be able to feel a depression such as is formed by two fairly convex bodies close together. The consistency of the object, the condition of the uterine tissue, the position of the uterus relative to the tumor, are valuable points to be determined; still there are many sources of error, as where the bodies are close together, or where the interspace between them is filled in by adhesions or by exudation.

Tumors which spring from the uterine adnexa lie, at least in the beginning, laterally. Those in the parametrium, in general due to exudation, are so close to the uterine wall, that it is impossible to find a point of separation. The form, immovability, unequal consistency and sensitiveness, enable us generally to differentiate small exudations, but the larger so frequently surround the uterus, that it seems to be completely merged in them. The bimanual examination is out of the question, and the most we can do is to feel the cervix surrounded by tense tissue. In case of collections of fluid in the neighborhood of the uterus, their consistency and relation to the vagina, the bladder and the rectum are to be determined. Tumors of the ovary, the broad ligament, the tubes, may at the outset be differentiated from the uterus, but as they increase in size they approach it more closely behind or to one side, and perhaps become imbedded in exudation products, and the difficulty in examination is rendered much greater. In these instances the great point to decide is as to the separability of the parts. Changes in posture are of great assistance; frequently bodies apparently immovable in one position may be found easily displaceable in another. We must always endeavor to differentiate the uterus and the ovaries from the tumor, since, for instance, the recognition of the ovaries apart from it certifies to the growth not being ovarian. We must always, furthermore, bear in mind the possibility of the presence in the pelvis of tumors or organs from the abdominal cavity, such as the spleen, the kidneys, or growths of the omentum or peritoneum, as also those originating from the walls of the pelvis, from the bladder, etc. The former may be differentiated by the means emphasized under the subject of abdominal palpation, and generally their independence from the genital apparatus may be recognized. Tumors of the bony pelvis are characterized by their close union with the pelvis, and generally by their consistency, although certain ones, such as an echinococcus cyst of the pelvic wall, might give rise to error in diagnosis.

II. Rectal Examination.

a. *The Simple Rectal Touch.*—The examination of the internal female genital organs must be made by the rectum when examination by the vagina is impossible or very difficult, owing to occlusion or narrowing of this canal, either congenital or acquired, in the presence of irreducible tumors, inversion of the uterus, vaginismus of high degree, and further still in case of developmental anomalies of the genitals, especially absence of or congenital vice of the uterus, and again for the purposes of palpating the recto-vaginal septum, the coccyx and the rectum itself. The rectal examination is also of value in case of short vaginæ and in case of all tumors which involve the posterior pelvic wall.

The examination of the rectum may be undertaken, even as that of the vagina, by the finger alone, by the combined finger and external hand, by one finger in the rectum and another in the vagina, and Simon recommended and practised the insertion of half or the entire hand. Formerly rectal examination was limited to cases where it was impossible to examine by the vagina, but Holst proved the great advantage which the rectal has over the vaginal examination under certain further conditions. It may be performed with the patient in the dorsal, lateral or knee-elbow position, the erect and the complete dorsal interfering with the deep insertion of the finger. Unquestionably this method of examination is both physically and psychically more objectionable to the woman than the vaginal, and it is, therefore, advisable not to spend much time in persuading her of the necessity of resorting to it, but to insert the finger immediately after the vaginal touch, with the precaution, of course, first to cleanse it and oil it. The index finger, two fingers, and occasionally the half or whole of the hand is to be used. In case of resort to Simon's method of rectal palpation, anesthesia is necessary, but the examination by one or two fingers is only painful in hyper-sensitive women, and in the presence of large hemorrhoids, fissures, or inflammatory affections. The finger is introduced and the remaining fingers are held even as in case of the vaginal examination. Elevation of the buttocks is of assistance, and it goes without saying that, where needed, the rectum should be emptied by an enema.

The finger first passes through the resisting anal opening, and we are thus informed as to the state of the sphincter, the existence of fissure, prolapse, hemorrhoids, polypi, and as to the distensibility and sensitiveness of the muscle. We next enter a wide cavity with yielding walls, the ampulla of the rectum. The anus constitutes the entrance into the lowest and widest part of the rectum. We examine here the state of the mucous membrane, the width of the rectum and its direction. Above the third sphincter (Hyrtl) or the plica transversalis recti (Kohlrausch,) through the anterior rectal wall, the finger feels the posterior wali of the vagina, the cervix, a portion of or the entire body of the uterus, frequently the normal, and almost always the enlarged ovaries, the border of the broad ligaments with the tubes, the retro-uterine ligaments, all the greater part of the inner wall of the pelvis, and very clearly the anterior surface of the sacrum and of the coccyx. This wide portion of the rectum is unquestionably more distensible and thinner than the vaginal wall, in particular the fornices, and this is the reason why the posterior wall of the uterus and the broad ligaments may be better palpated than by the vagina, and also why tumors in the posterior pelvic space, whether new growths of the uterus or the ovaries or exudations, are more readily investigated.

A frequent source of error with beginners is the cervix, which projects against the rectal wall as a large soft body, and simulates the body of the uterus. The differential diagnosis may be made by seeking for the os, which may usually be recognized through the rectal and vaginal wall, or else by means of the combined rectal and vaginal touch.

b. *The Rectal Examination by the half or the entire Hand.*—In cases where examination by one or two fingers does not give sufficient information, Simon was the first to teach the advisability of using the half or the entire hand. According to him, the procedure is as follows: The patient must be told of the necessity of such an examination, and that for some days afterwards she may suffer pain and from incontinence of fæces. The rectum is to be cleared out by profuse irrigation, and the patient deeply anesthetized, for only under complete anesthesia does the sphincter relax sufficiently to permit the introduction of the entire hand. With the woman occupying the dorsal position and with sharply flexed thighs, the examiner inserts two and then four well-oiled fingers by slow rotatory movements into the rectum. In case the entire hand must be introduced the thumb is also inserted, and if the conditions are favorable, penetration may be accomplished as far as the wrist. A hand of not more than nine and three-quarter inches in circumference, may be inserted frequently without causing hemorrhage, but if the borders of the anus are too tense or if they seem on the point of rupture, slight incisions may be made by a blunt-pointed bistouri, or else a deep cut may be made through the sphincter in the posterior median raphe. Such incisions heal after a few days, but in case of the posterior it is well to insert a suture to guard against hemorrhage. Incontinence should never be lasting.

Under favorable conditions, where the rectum is wide and distensible, and the pelvis is not invaded by an immovable tumor, the hand may move around in the ampulla of the rectum, and the four fingers may reach into the narrower upper portion. This upper portion is narrowed by the bands of peritoneum which form the posterior uterine ligaments, and which extend backwards in concave folds from the junction of the neck with the body of the uterus. The anterior folds, the semicircular ligaments of Douglas, form with the recto-uterine ligament a crescent, with concavity downwards, which bounds Douglas's fossa above, and below it the peritoneum sinks to the extent of one and a half to two inches.

Penetration into the rectum may be very dangerous, and we must be careful not to penetrate further than the upper portion, since the peritoneum is readily separable from its attachments, and rupture of the blood-vessels may result. Still, under very favorable conditions the greatest circumference of the hand may reach the folds of Douglas, and the four fingers may extend beyond the upper third of the rectum into the lower part of the sigmoid flexure, when we may palpate to the height of the umbilicus, and reach the anterior abdominal wall. Ordinarily, however, the most possible is to reach beyond the uterus in its normal position. It goes without saying that an examination of this nature must be accompanied by the use of the external hand on the abdomen.

As to how high now it is possible to examine the pelvic cavity beyond the point reached by the finger alone, Simon places it in favorable cases as five and three-quarter inches, and for cases where the insertion of only the half hand is possible as two and three-quarter inches, figures which, as Landau justly remarks, are only approximate, seeing that, owing to the curve of the rectum, the hand does not follow a straight line, but quite a curved one. Nevertheless, this method of rectal examination may give excellent results, seeing that thereby the pelvic organs may be felt more directly than by any other way, since only the thin rectal walls intervene. We obtain not alone indirect evidence, but direct as well of the state of these organs, and are able to state positively as to whether a questionable tumor is ovarian, for instance, or not (Landau). Still it is not rational to consider this method as always certain in its results. Only in the hands of the most expert is it always applicable to purposes of diagnosis, and there are numerous cases on record where it has yielded very insufficient data (Spiegelberg, Landau).

Ordinarily the question to be solved is the connection between tumors and the uterus or ovaries, questions which can only be answered in cases where the tumors are not too large, and where the uterus may be differentiated by means of the bimanual palpation. The method is also of value for the determination of retro-peritoneal tumors, such as of the mesenteric glands, the kidneys, the intestine, and in case of invagination. In case of fæcal impaction, where it is difficult to insert the syringe, the method has proved of service to us.

Rectal examination by the hand is not entirely free from danger. In Simon's master hand there never occurred anything beyond slight tears, but a number of instances of deep lesion have been recorded (Weiss has reported an instance of rupture of the anterior rectal wall), and small tears of the rectum sometimes do not readily heal. Aside from these facts, the method itself is such a disagreeable one that it should never be resorted to except in the presence of strict indication.

Among the contra-indications are to be noted all those tumors which fill the pelvis, great narrowing of the rectum as the result of cicatrices or infiltration of its walls, by carcinoma for instance, recent inflammatory processes in the pelvic organs, or the pelvic cellular tissue, abscesses, hæmatocele, pyocele, hematometra even, since the great pressure induced might lead to rupture.

Altogether we may say that Simon's method of rectal examination does not accomplish all that was at the outset claimed for it. The more expert the examiner the better will he be able to make a rectal examination by the finger alone, which will often yield better results than the whole hand.

In case of the simple rectal examination or that by the hand, the bimanual must be resorted to in the same manner, and under the same rules as in the vaginal examination. It is further possible to combine the rectal with examination by the vagina or bladder. By the vagina either the thumb of the same hand or else the index of the other hand may be used. In either way the recto-vaginal septum lies between the fingers, and its condition may be determined, and by imparting movement to the cervix by the vaginal finger, the effect on the body of the uterus may be noted by the rectal finger. If the fingers are inserted still higher, the entire lower uterine segment may be palpated, and in this instance it is preferable to use the index fingers, since with them we may reach higher and feel better than with the thumb.

III. Examination by the Urethra and the Bladder.

Only in exceptional cases is it possible to penetrate through the urethra into the bladder with the finger without precedent dilatation. Here and there it happens, generally unintentionally, where,—because of narrowing or impermeability of the vagina, or some error in development,—cohabitation has taken place through the urethra, and such instances are not as infrequent as is believed. As a rule, vesical touch must be preceded by dilatation of the urethra as a preparatory measure. The urethra cannot be stretched as readily as the sphincter ani without resulting incontinence, Exact figures as to dilatability cannot be stated, although the maximum would appear to be, with few exceptions, about two and three-quarter inches. In only a single case, in a woman who had cohabited *per urethram*, have I been able without preliminary dilatation to insert the index and the middle finger into the urethra to the extent of over one and three-quarter inches, which necessitated a distension to the extent of three and a half inches, without resultant incontinence.

For purposes of dilatation I use the hard rubber dilators which will be described under the heading of rapid dilatation of the uterus. By means of these the urethra may be sufficiently dilated in a few minutes, to enable the index finger to be inserted. If the borders of the urethra are too tense, then we may nick them slightly. Simon was in the habit of doing this before proceeding to dilatation, making an incision to the depth of one eighth of an inch right and left with the scissors. Slower dilatation by means of tents, the fingers or more or less complicated instruments is of less value, and is inferior to rapid dilatation. Simon's second method of making an artificial fistula is rarely used for purely diagnostic purposes.

Dilatation and examination are best accomplished with the patient in the dorsal position. Anesthesia is induced, and the smallest, well-oiled, hard rubber dilator is gently inserted into the meatus, and slowly pushed forward. After the lapse of one to two minutes the instrument is removed and the next size inserted, and so on until the largest number has been introduced. As soon as this has been accomplished, the index finger is at once passed into the bladder. The rule as to the choice of hand is the same as in case of the vaginal examination. The remaining fingers are either flexed, or else, what is preferable, the middle finger is inserted into the vagina. When the finger has passed through the meatus, the narrowest part of the urethra, it easily reaches the neck of the bladder, and thence the cavity of the organ itself, and it feels the trigonum, where the expert examiner is able to detect the openings of the ureters, into which Simon often inserted the sound, a procedure which has latterly been carefully studied by Pawlick. If we next perform the bimanual, we feel through the bladder the anterior surface of the body of the uterus, the fundus, the broad ligaments, with great ease. The vesico-vaginal septum is best examined between the thumb in the vagina and the finger in the bladder.

If the vesical examination were accompanied by as few untoward after effects as that by the rectum, it would without question be frequently resorted to, for the results as regards the anterior pelvic space are as valuable as those noted under the rectal examination for the posterior pelvic space.

The vesical examination is resorted to in case of diseases of and foreign bodies in the urethra and bladder, in cases of diseases of and anomalies in the urethro- and the vesico-vaginal walls, in case of anomalies of the round ligaments, and of the anterior portion of the broad ligaments, in case of tumors which occupy the anterior wall of the uterus, and in case of defects of this organ, in case of ante-uterine hematocele, and exceptionally of hematometra, in case of defects in the vagina which interfere with the touch, or where there exists a rudimentary state of the vagina or uterus, in conjunction with examination by the rectum. In the latter instances it may suffice to pass a catheter into the bladder, by means of which the vesical wall is pressed down against the finger in the rectum, which is then able to determine the rudimentary state of the bladder and of the uterus.

Although the vesical examination does not result in permanent incontinence, and is not accompanied by hemorrhage worthy of mention, still it is an operation only to be resorted to in case the other exploratory routes are impassable. Generally the examination by means of the catheter in the bladder, and the finger in the rectum should be favored as the preferable method.

CHAPTER X.

THE EXAMINATION BY MEANS OF THE SOUND.

INSTRUMENTS like the sound were often used for diagnostic and therapeutic purposes by the older writers. Probably the use was limited to measurement of the vagina before the introduction of the speculum, and it is so described by Paulus Aegina and Soranus. The instrument was then forgotten up to the middle of the eighteenth century, when it was re-introduced into practice by Levret and S. Lair, but it was not elevated to the rank of a diagnostic measure until the days of Simpson, Kiwisch, and Huguier. It was at once utilized by the majority of gynecologists, and results claimed for it which practically it is unable to attain. The chief use of the instrument is for the purpose of determining the position and the size of the uterus. Simpson, Rigby, Kiwisch, Tilt, West, Martin and others, deemed the sound unnecessary for such purposes, while others, such as Sims, and above all Thomas, claim that no diagnosis of disease of the uterus can be considered complete until the sound has been used. To-day the majority of German gynecologists do not agree with Scanzoni in regard to the manifold usefulness of the sound, and while we do not consider the instrument as absolutely useless for purposes of diagnosis, we claim that its use should be combined with that of other measures, especially the bimanual palpation, from which we may obtain the most certain results.

For the purposes of examination with the sound, any blunt or knob-pointed flexible rod, at least seven and three-quarter inches long, or any elastic catheter armed with its stylet will suffice, but on account of the greater ease in manipulation, a number of uterine sounds have been devised. The most generally used are those of Kiwisch, Simpson, and Sims, while those of Valloix, Kugelmann, Lazarewitsch, Cambanis and others, being more complicated, are less in demand.

A useful and conveniently handled sound should possess the following characteristics: It should have a length of at least seven and three-quarter inches exclusive of the handle, and should end in a round or egg-like point. It should be constructed of such material as to enable it to be bent to any desired curve, which it will retain, and yet not be so soft as to be unable to pass a slight obstacle. Its surface should be smooth, or at least the measure markings should not be roughened, and finally the handle must be so constructed as to tell us the direction of the convexity of the instrument when it has been inserted into the uterine cavity.

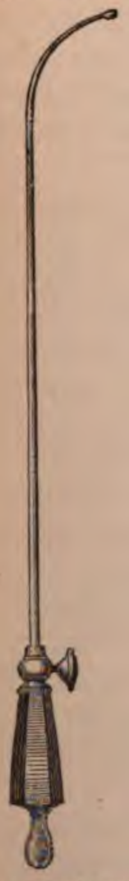


FIG. 11.—SIMS' SOUND.

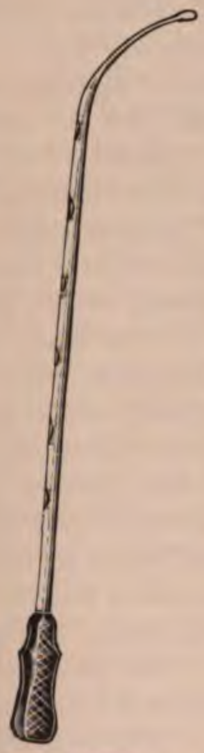
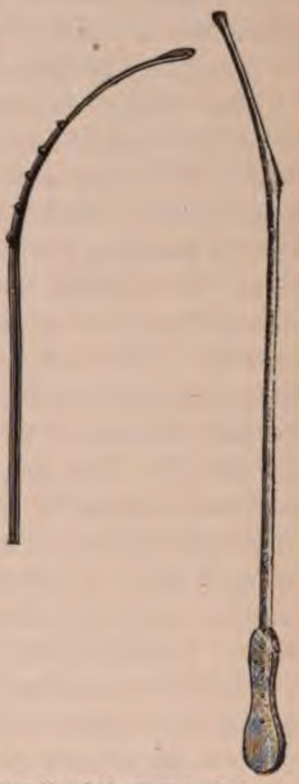


FIG. 12.—SIMPSON'S SOUND.



FIGS. 13 and 14.—SCHULTZE'S SOUND.

The instruments most frequently used are those of Simpson and of Sims. Latterly almost every gynecologist has devised his own sound, which differs as regards curve (Schultze), material, marking, etc. I have for a long time dispensed with all instruments which have knobs, markings, or complicated mechanism, on account of the difficulty of keeping them clean and the danger of infection, and I use entirely instruments constructed of silver or nickel-plated copper, and which bear on their surface a slight swelling about two inches and a half from the tip, and slight depressions anteriorly, which divide it into millimeters. We need, of course, a number of varying thicknesses.

The insertion of the sound is ordinarily a very simple matter, but in case of abnormality of the uterus, in particular flexion, it may become a difficult matter even for the experienced. The use of the instrument must always be preceded by the bimanual palpation in order to determine the position and the shape of the uterus.

After thorough disinfection of the vagina, and when possible of the uterus, the sound is introduced with the patient occupying the dorsal position, the thighs widely separated, or else with the patient in the lateral position. Examination in the latter position, as also in the erect, which is favored by Kiwisch, interferes with the coincident resort to palpation. In the dorsal posture a finger is inserted into the vagina up to the external os, and the previously warmed sound is guided along this finger up to the os and into it. The handle of the instrument is held between the thumb, index and middle finger. (It goes without saying that both hands should be trained to use the sound.) When the external os is normal in position and in size the instrument readily enters; in case of displacements of the uterus, however, or where the orifice is narrow or distorted, the insertion requires extra care and expertness. Many examiners insert the middle as well as the index finger into the vagina, steady the cervix and pass the sound into the os between the opposed fingers. In case of great displacement it is useful to steady the cervix by means of a tenaculum. When the sound has passed through the external os and reached the cavity of the cervical canal, it may ordinarily glide in to the extent of about ¾ of an inch, although it may catch in the folds of the cervical mucous membrane, and this is the more likely to happen the more slender the sound used. For this reason, and in order not to injure the mucous membrane, it is preferable to use thick sounds. In case it catches, the instrument must be pulled out a trifle and the attempt made to pass it in another direction. Frequently the end of the sound must be bent in order to pass by Nabothian follicles or mucous polypi, and the instrument must often be made to traverse the lateral, anterior and posterior surfaces in order to overcome the obstacle.

At the extremity of the cervical canal the instrument comes in contact with a slight obstacle, the internal os, where there exists a narrowing. In the normal uterus, and especially in young girls, the instrument passes this point under slight pressure into the uterine cavity. The amount of pressure which may be used is a question of individual experience, generally the weight of the instrument itself is sufficient. It is at this point that the parenchyma of the uterus is most likely to be injured. It should never be forgotten that the sound is intended to glide along an already existing canal, and that it forms with the finger in the vagina a single or double lever with very unequal arms, so that whatever pressure is made at the handle is transmitted much intensified to the point of the instrument. Great resistance at the internal os is only infrequently due to marked and lasting narrowness of the canal. Strictures of the os, which are seldom met with, generally yield to prolonged pressure by the knob of the instrument. In general, marked narrowing of the os is due to swelling of the cervical mucous membrane, or to the not infrequent flexion found at this point, or, finally, to the presence of new growths. In the event of marked narrowing at the internal os we may often determine with the sound the extent in millimetres. The instrument is then pressed upon, even as is a catheter through a callous stricture, the pressure being gradually increased as the sound enters deeper and deeper, and we may feel the uterus move as it is lifted up upon the instrument. In women who have borne many children, in whom the internal os has been widened by collections of fluid, the presence of new-growths or of inflammatory processes in the mucous membrane or the parenchyma, it is frequently impossible to tell when we pass the site of the internal orifice. Only exceptionally then do we feel the limit between the transversely roughened mucous membrane of the cervix and the smooth membrane of the uterus.

The passage of the sound by the internal os is generally accompanied by an unpleasant sensation to the patient. Ordinarily the feeling is the same as that which precedes the onset of the menses. In case of narrow canal, however, and in sensitive individuals, there frequently results uterine colic, which may be intense. The appearance of a drop of blood on the withdrawal of the sound is not uncommon, and it points always to injury of the mucous membrane and must be looked upon as abnormal and undesirable.

By means of the previous bimanual examination we are already informed as to the position of the uterus, and therefore we know the curve which we must give the instrument. In every position of the uterus where the body lies forward, and therefore in case of the normal position, the sound enters with its concavity forwards and upwards and the handle rests against the perineum.

Flexions of high degree necessitate the giving of a sharp curve to the instrument. This is accomplished best by means of the finger in the vagina, which pushes the uterus backwards and upwards. During this manipulation we are able to differentiate between a marked stenosis at the internal os and a narrowing due to flexion.

When the uterus lies backwards the sound is directed downwards from the internal os with its concavity downwards, and in case of flexion the procedure is the same as for anterior distortion, only that the direction of the instrument is different.

As soon as the instrument reaches the fundus the hand is generally conscious of it, and the sensation to the patient is that of a slight shock. In case of a relaxed uterus, especially the puerperal, but very slight pressure should be made, since the point of the sound may readily penetrate the tissue of the uterus and even through the organ. Attempts at lifting the organ on the sound or at feeling the extremity through the abdominal walls are almost always forbidden in such cases. On the way to the fundus we may test the condition of the uterine mucous membrane by gentle pressure with the extremity of the sound along the anterior and posterior wall. By drawing the sound backwards and forwards with care it is possible to detect the presence of tumors in the cavity, and in favorable cases the nature of the union of these tumors with the uterus. During these same manipulations we obtain an idea of the movability of the organ.

When the instrument has been passed to the fundus it is steadied by the hand of the examiner or by an assistant, and then by resorting to the simple or the combined vaginal touch we may determine the position of the uterus when steadied by the sound in relation to the other pelvic organs or to tumors. Movements imparted to these tumors while the sound is in the uterus often lead to valuable results.

To measure the depth of the uterine cavity the index finger in the vagina is placed along the sound close to the external os; the other fingers surround the instrument; which is then withdrawn in the reverse direction from which it was inserted, taking care lest the index finger slip.

Even the experienced examiner may find difficulty in passing the thick metallic sound into the uterine cavity in cases where the passage is distorted by the presence of tumors. In such cases an elastic catheter may be used after the manner recommended by Sims. Since the catheter armed with its stylet is altogether too inflexible, and yet since without it the heat of the body renders it too soft to pass by the external and internal orifices, Sims recommended to pass the catheter with its stylet to the internal os, and then to withdraw the stylet slightly when the catheter becomes flexible at the portion which enters the uterine cavity, and it may feel its way beyond the internal os. This method, however, is not the best, seeing that the instrument bends on itself, and the results of measurement, therefore, are to be taken only *cum grano.*

In the lateral position the sound is passed either under the guidance of one or two fingers or after exposure of the cervix through the speculum. It is undeniable that it is easier to pass the sound in this way, especially since the cervix may be steadied by a tenaculum and flexion may be in a measure effaced by the exerted traction. By means of such traction with the tenaculum a flexion, in case the uterus is movable, is lessened in the direction of the pelvic axis; and in instances of flexion with fixation of the body of the uterus the cervix should be drawn in the direction opposed to that of the flexion—that is to say, in case of anteflexion backwards, and in case of retroflexion forwards.

The sound should really always be inserted after the cervix has been exposed through one or another valvular speculum, for thus only is possibility of infection avoided. The wishes of the patients, however, and the necessity of avoiding repetition of measures previously used, require us to-day, in particular in the consulting room, to neglect such rules. The least that we can do is to carefully cleanse the vagina by means of injections. The use of the sound through the cylindrical speculum, as is recommended by Lair and even by Thomas, is not to be advocated for diagnostic purposes, and the results obtained are far below those from the other methods. The insertion, furthermore, is difficult, in that the room for manipulation is very limited, an objection, however, not applicable to Bandl's speculum.

The sound is used both for diagnostic and for therapeutic purposes. We will consider these in turn, and first in regard to diagnosis.

1. *To ascertain the patency of the cervical canal.*—This indication as

regards the external os and cervical canal is a generally absolute one. Only exceptionally, in case of closure or narrowing at the level of the external os, can the finger or the speculum detect it. In other instances, and also to determine the degree of narrowing, the sound must make the diagnosis. An opinion may, of course, be formed as to the patency and width of the external os, from the changes in the uterus the result of stenosis, as also from the rational history in regard to dysmenorrhœa and sterility. Still the sound alone can give positive data. It is far more difficult to determine the size of the internal os. If it is not easy to make an exact statement in regard to the nature of an obstacle which arrests the sound to a depth of 1¼ inches, the more the expertness requisite and the more necessary the repeated manipulations to differentiate between abnormalities in the direction of the canal and simple narrowing. Such is the reason why inexpert examiners meet so frequently with stenosis at the internal os.

2. *To ascertain the depth of the uterine cavity.*—By means of the sound and the touch we are able to determine not only the total length of the uterine cavity but also that of its individual segments. The vaginal portion of the cervix is measured by the finger, the cavity of the cervix is measured by the sound, and by subtracting the one from the other we obtain the depth of the supra-vaginal portion of the cervix. The total depth of the uterine cavity is obtained by deducting the measurement of the cervical cavity. Any conclusion as to the length of the uterus obtained by the bi-manual palpation is open to error, since the thickness of the walls of the uterus is an unknown quantity, and similarly the total measurement obtained by the sound gives us no exact conclusion in regard to the total length of the uterus. The two means combined, the bi-manual and the sound, give us the most reliable results as to the thickness of the uterine walls, seeing that from the total length may be deducted the depth of the cavity obtainable by the sound.

3. *For determining the width of the uterine cavity—that is to say, its capacity.*—The data here are less certain. They are obtained by a comparison of the obtained length with the greater or less movability of the sound in the uterine cavity, and the extent to which it may be moved sideways. These results are open to error, because on account of the curvature of the uterus the movements of the sound are limited. This remark is all the more applicable to cases in which the uterine cavity contains tumors.

4. *For ascertaining the thickness of the walls of the uterus.*—The thickness of the walls of the cervix may be readily determined, since they may be included between the finger in the vagina and the sound in the cervical canal. The thickness of the uterine walls are estimated by pressing the sound backwards and downwards against the finger in the vagina, or better still in the rectum, for the posterior wall, and the finger in the vagina, bladder, or through the abdomen, for the anterior wall.

5. *For determining the contents of the uterine cavity, the presence of tumors, and for ascertaining the condition of its mucous membrane.*—The sound only very exceptionally gives us reliable information in regard to these points, although it was formerly recommended by Kiwisch and Scanzoni for the diagnosis of pregnancy. Mistakes are often made as the result of deviation of the canal of the uterus from its natural direction, from the catching of the point of the instrument in folds suggestive of tumors, and again from the insertion of the point into soft bodies in the cavity, such as blood clots. Even in case of pregnancy the sound may readily glide between the ovum and the uterine wall without injury to the former, and there are many instances on record of the use of the sound in ignorance of pregnancy without interfering with its course.

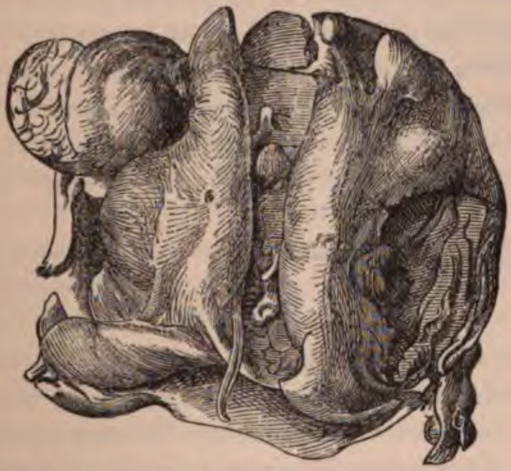


FIG. 15.—UTERUS CONTAINING A MYOMA AND MUCOUS POLYPI. (Two-thirds natural size.

In case movement of the sound is free enough to enable us to draw some conclusion from the sensations communicated to the point of the instrument, then we may here and there draw certain inferences. We may detect the rough nodular projections from the tumor or the mucous membrane as the extremity of the sound passes over them. By means of the instrument we may determine the presence of small tumors, mucous or fibrinous polypi, or broad-based fibromata, but generally such small tumors escape us, since we are not able to explore the entire mucous membrane with the point of the instrument, and we must never forget that there are instances, as in Fig. 15 for example, where the tumor lies closely against the surface of the uterus and can never be recognized by the instrument. In the case illustrated, where severe dysmenorrhœa was the symptom, the curette was necessary to make the diagnosis on the living, and yet the use even of a curette like the annexed does not preclude error.

Large tumors may ordinarily be detected by means of the bi-manual palpation, as well as the relation which they bear to the wall of the uterus, but even as in case of smaller growths exact data are only obtainable by resort to digital examination after dilatation has opened the way. Still, in connection with the depth of the cavity as ascertained by the sound, we may form a probable conclusion in regard to the size of tumors, and we may often differentiate between growths occupying the anterior and posterior walls, since in the former instance the instrument glides along the anterior, and in the latter the posterior surface of the growth into the cavity of the uterus. The direction of the handle of the sound together with the curve given to it give us information, but the result is more positive if we endeavor to feel the sound in the uterus through the rectum, bladder or abdominal wall. It is still more difficult to determine whether the tumor is sessile or pediculated. Only in case of small and of medium-sized tumors is it possible to explore around the base of the tumor with the extremity of the instrument, and even then very exceptionally. The diagnosis between inversion of the uterus and polypi depends on the determination of the position of the uterus.

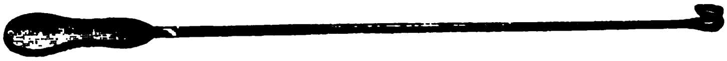


FIG. 16.—CURETTE.

6. *For the determination of the direction of the canal of the uterus.*—The differential diagnosis here lies between tumors of the uterus and its displacement. The sound is often used for this purpose by those who believe it essential for the determination of the position of the uterus, but

the more carefully the bi-manual examination is performed the less the need of the sound in this connection. Only where the bi-manual palpation is impossible, as for instance in case of hematocele or exudations around the uterus, or in case of small exudations or tumors which from intimate connection with the uterus render it impossible to make out the separation, or the fact that the uterus does not occupy its normal position, only then is it necessary to resort to the sound. We must never forget, however, that in such instances we are deviating from the rule never to sound a uterus the position of which we have not determined by the conjoined touch, and this is a further reason for limiting resort to the sound to cases of absolute necessity. The direction of the uterus in case the sound is used is determined by the position of the handle and of the concavity of the instrument. The diagnosis between a questionable tumor and the uterus is made by the direction which the sound takes. It enters forwards in case of anterior displacement, and backwards in case of posterior displacement. Generally the question at issue is between tumors in the posterior pelvic space and retroflexion. In case the sound, directed forwards, penetrates to a sufficient depth, then, of course, we are not dealing with the retroflexed body of the uterus, and movements of the uterus will further assist in differentiation.

In case of developmental anomalies of the uterus the sound is also of assistance in diagnosis. The presence of a septum, the uterus unicornis and bicornis, may be differentiated by the simultaneous use of two sounds.

7. *For determining the movability of the uterus.*—The bi-manual examination here as well gives more certain information in regard not only to the movability of the entire uterus but also as to that of a flexion. At any rate we should only attempt to impart movements to the uterus by means of the sound with the greatest caution. In case of large tumors the sound in the uterus is steadied by the hand, and then motion is imparted to the tumor by the other hand, and the effect on the sound noted. The opposite procedure, to move the uterus by the sound and to note the effect on the tumor, is to be considered dangerous, as also attempts to lift up or push down the uterus by means of the sound in order to detect adhesions and their effect on the organ. The tenaculum or forceps better subserve these purposes.

The use of the sound for the purpose of determining the presence of inflammatory affections of the organ is only countenanced by its firmest adherents, as for instance Thomas. Aside from the fact that the use of the sound is here dangerous, it is painful and causes hemorrhage, and we are able to reach a diagnosis of inflammation in other ways much better.

As for the therapeutic uses of the sound, as early as 1808 Osiander lifted up the retroverted uterus by means of it, and after him Carus, Meissner, Kiwisch, Velpeau, Depaul, Valleix, and a host of other champions of the intra uterine, orthopedic, method of treatment. For this purpose, in case of retroflexion, the instrument is introduced with its concavity downwards, and it is then turned through an arc of 180°, describing a half-circle the radius of which is coincident with the curvature of the instrument, during which manipulation the uterus is subjected to not inconsiderable pressure unless it describes a similar circle. On this account Sims devised a uterine elevator, by means of which the lateral movements are dispensed with and the direction of the repositing force is in a straight line. Mitscherlich, Gardner, Emmet, Noeggerath, and Howe, have devised similar instruments, and Hertzka aimed at the same result by inserting through an elastic catheter in the uterus stylets of varying curvature.

The advantages of making the uterine sound such an elevator have been made clear by Rasch. His method consists in introducing the sound into the uterus and moving it in its long axis, the fixed point of the instrument being at the external os, and the handle describing a large half circle in the same way as the "tour de maitre" is performed with the catheter, so that the part of the instrument which was originally placed downwards becomes uppermost In this way all twisting of the uterus is avoided. If now the finger in the vagina is placed against the sound at the external os, and we use it as the fulcrum, we may lift the uterus by sinking the handle of the sound which rests against the uterine wall, the pressure being distributed along the anterior surface of the instrument even as when Sims's elevator is used.

Tiemann of New York has devised a very ingenious repositor, known as Elliot's, and which consists of two feathering blades within an elastic catheter, which may be bent backwards or forwards to an angle of nearly 180° by turning a screw in the handle of the instrument. Still the combined manipulation, assisted by the tenaculum and possibly dilatation of the uterus, are preferable methods. On account of the difficulty of cleansing these instruments they cannot be recommended.

[For the purpose of elevating the retroflexed, retroverted uterus, the fingers assisted by posture are, wherever possible, preferable to any instrumental means. It is surprising with what ease this may ordinarily be accomplished, and with absolutely none of the risks or pain involved by the use of the sound in particular. In case the fingers fail, one or another repositor (Sims's or Emmet's) is preferable to the sound, seeing

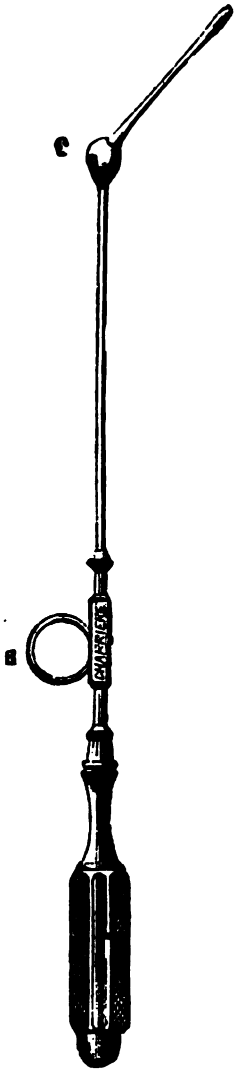


Fig. 17.—Sims' Uterine Elevator.

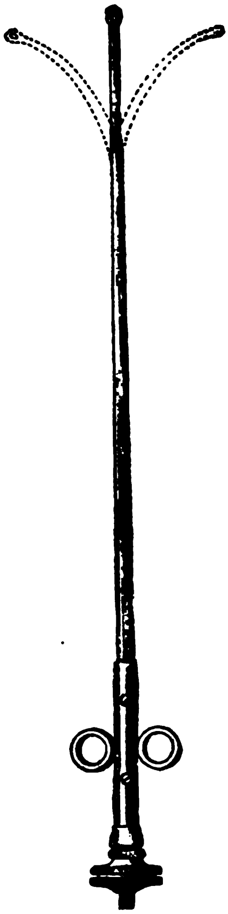


Fig. 18.—Tiemann's Elevator.

that except in the hands of the most expert this latter instrument may readily injure the uterus. For manual reposition the patient should lie in the left lateral (Sims's) position, so as to obtain the assistance of gravity, when all that remains is to lift the uterus into the vertical axis and the organ will fall forward. The examiner should, by preference, stand well behind the patient, and insert the index and middle finger of the right hand well up into Douglas's fossa, the dorsum of the fingers being directed against the cervix at the vaginal junction. Now by forward and upward pressure through these fingers the organ is lifted in the same direction as much as possible, and there held by one finger while the other is transferred anteriorly and pulls the cervix backwards. In this simple way the uterus may in the vast majority of instances be readily anteverted. Exceptionally this method will fail because of the impaction of the fundus under the promontory of the sacrum. The best method then is to cause the patient to assume the knee-chest position, to expose the cervix through Sims's speculum, and, hooking a tenaculum into the anterior lip of the cervix, to pull the uterus gently downwards, which dislodges it from the sacral hollow, and then to push the cervix backwards by means of the instrument. Only very rarely will one or another of these means fail in anteverting the uterus, and when they do it is because the fundus is adherent, when, of course, instrumental reposition will fail as well. The more practised the examiner, indeed, the less frequently will be resort to the sound or the repositor for anteverting the uterus.—Ed.]

Simpson was in the habit of using the sound for the purpose of assisting involution of the puerperal uterus, as also Lehmann, and in more chronic cases Fürst, and the first two gentlemen also resorted to the instrument in case of flexion as a means of causing the uterus to assume its correct form. It is undeniable that involution may be assisted by the passage of the sound, seeing that thus the flexion which interferes with the circulation is lessened and the cervical canal is kept open, and it is also true that even the simple passage of the instrument has occasionally sufficed to relieve dysmenorrhœa and to cure sterility; still it is essential to remember that such results are not obtained through any dynamic powers peculiar to the sound. In addition to the use of the sound for the purpose of straightening the uterus, we have at our disposal various intra-uterine pessaries, such as those of Kiwisch, Simpson, Valleix, C.

Mayer, Kilian, Detschy, Greenhalg, etc. The insertion of a stem pessary should be preceded by that of the sound, for purposes of diagnosis. Many writers, Olshausen for instance, advocate leaving the sound in the uterus for a few minutes to test the tolerance of the organ before inserting the stem, while Veit, Winckel and others insert the stem at once. It was Malgaigne's practice to introduce the sound in order to determine the irritability of the internal os. The sound is also frequently used as an emmenagogue, being inserted a number of times before the expected menstruation, and being left in the cavity for awhile.

The dangers from the use of the sound are frequently much exaggerated. Still it is very essential that beginners should ever bear them in mind. Further, it is true, as Scanzoni says, that the more expert one becomes the less he uses the sound. The inexpert resorts to it frequently in the belief that it is an essential diagnostic means, while he is really more likely to do harm by means of it.

Since, in 1854, Broca reported the first case of death from the use of the sound, the number of recorded and unrecorded cases have largely increased, and still more numerous are the instances where slight and serious diseases have been caused by it. Every moderately busy gynecologist is familiar with such instances.

The passage of the sound by the internal os is generally painful, and even in the hands of the most expert uterine colic may result, also sudden collapse, the result either of the closure of the cervical canal, or else from the excitation of the uterine wall or the fundus by the point of the instrument. Such colic results the more readily the more irritable the uterus, the narrower the canal, and the greater the degree of displacement. Even the use of a not previously warmed instrument may result in irritation. Similarly more or less hemorrhage may result, although generally it is caused by direct injury to the endometrium, generally at the isthmus.

The healthy mucous membrane ought not to bleed from the careful passage of the sound; but in case it is congested or not intact, as before menstruation, during the puerperium, or in the presence of new growths, then even the skilled insertion of the instrument may cause hemorrhage. Frequently such hemorrhage will give us information of importance in diagnosis, but the reverse, the absence of hemorrhage, does not mean that nothing abnormal is present, for even the insertion of the sound into the gravid uterus is not always followed by bleeding. Since it is often impossible to recognize gestation at its inception, and since the sound by rupturing the ovum or awakening uterine contractions may cause miscarriage, it is therefore always essential to bear this question in mind, for there are women who, in their desire to have a miscarriage induced, purposely give such a history as will lead the examiner to pass the sound. Although as we have stated the instrument was formerly utilized for the diagnosis of pregnancy, and although its use does not always produce miscarriage, nevertheless, except with the intention of causing abortion, the instrument should not be resorted to in the presence of pregnancy. In order to impress this fact constantly on the physician, Cameron had the handle of his sound constructed in the shape of a fœtus.

Inflammatory processes will always be intensified by the insertion of the sound, whether it be an acute inflammation of the uterus and its adnexa, or a chronic process which is rendered acute. In such instances great pain, hemorrhage, and increase in the intensity and in the extent of the disease, almost infallibly result. Above all are movements imparted to the uterus dangerous since they may cause rupture of adhesions and hemorrhage into the peritoneal cavity.

Ordinarily the ill results from the use of the sound are injury of the endometrium, the parenchymatous layer, or even perforation of the uterine walls. I am personally familiar, however, with two cases of fatal septic parametritis which followed the use of the sound in expert hands, and where there was no obtainable evidence of injury to the uterus. Indeed the greatest risk from the sound lies not in the mechanical injury but in the chance of infection. The more relaxed and succulent the tissue of the uterus, the narrower and more tortuous the canal, the more inflexible the instrument, the more likely the chance of partial or of complete perforation. The internal os in case of flexion, and the fundus, are in particular likely to be injured. The results of such injury are generally slight hemorrhage, a traumatic inflammation of the uterine parenchyma or mucous membrane and its sequelæ, and in case of perforation damage of the peritoneum. Still such perforation is not always followed by bad results, as is proved by the not rare instances on record of "sounding of the tubes." The dilatation and cauterization of the tubes advocated by Tyler Smith, R. Froriep, and others, is proved possible by the researches of Bischoff, Lehmann, and Biedert, which go to show that the ordinary uterine sound may be introduced into the opening of the tubes. This necessitates, however, the existence of abnormal patency of the tubes, and an easily movable uterus. In Bischoff's case, for instance, the ostium uterinum was funnel-shaped, and in Hildebrandt's first case the extremity of an intra-uterine pessary had probably dilated the ostium. It is to be noted, on the other hand, that the cases recorded by M. Duncan, Veit, Hildebrandt (second case), Lawson Tait, Zini, were probably instances, as Höning suggests, of perforation of the uterus. Introduction of the sound to the depth of seven inches has been noted by Simpson, Höning, Schröder, Martin, Noeggerath, Rabl-Rückhardt, Lehmus, and others, and were believed to be cases of perforation, although ordinarily there was no reaction, but only a little pain and hemorrhage. Injuries of this nature do not usually concern the normal uterus, but that which is still largely in a condition of puerperal involution, where in other words the conditions favorable to perforation are present. The same injury may be inflicted in the presence of sarcoma and of carcinoma. In cases of complete perforation the sound passes deeply into the peritoneal cavity, and may be pushed in even up to the handle, the extremity being felt under the abdominal walls in the neighborhood of the umbilicus. Where the sound is sharply deviated to one side the idea of entrance into the tube is suggested, provided we have excluded developmental anomalies of the uterus.

The correct use of the sound requires more practice than we are justified in subjecting the living patient to, and therefore expertness should be acquired by experiment on the cadaver. I teach students to sound the uterus in the dead body and to endeavor to perforate it, and the requisite amount of force is found to vary greatly. I have never found at the autopsy, however, as is claimed by Rockwitz, that the uterus lifted up on the sound was perforated.

CHAPTER XI.

THE EXAMINATION BY MEANS OF THE SPECULUM.

BEFORE inserting the speculum it is best again to inspect the external genitals. In the dorsal position the mons veneris and the external portion of the labia majora are at once evident. In young women and in those who have never borne children the labia majora are in close contact. If they are asymmetrical this suggests new-growths, edema, etc. When they are separated we see the clitoris, the nymphæ, the meatus urethræ and a little within this, when its edges are pulled apart further still, we see the lower part of the introitus vaginæ, the fossa navicularis, and the posterior commissure. We may further glance at the hymen or the myrtiform caruncles, the inner surface of the thighs, the perineum, and, when the nates are elevated or the patient is in the lateral position, the anus and its neighborhood. Where the vagina is gaping, as in women who have borne children or have suffered rupture of the perineum, we also see the lower third of the vagina, the bulb of the urethra with the carina vaginæ, and the columna rugarum posterior. We may inspect the lower third of the vagina to better advantage by pulling apart the walls with the bent fingers, or with elevators. The lower part of the posterior vaginal wall may be everted by the finger inserted into the rectum as also may the rectum by the finger in the vagina. Similarly, the lower part of the anterior vaginal wall may be depressed by a sound in the bladder. We should notice the form, size, color of the surface of the lower genital segment; we must look for tumors, varices, inflammatory signs, cicatrices, to determine which the speculum may be needed, for congenital and acquired defects. For the purpose of such inspection, as well as for the use of the speculum, much exposure of the patient is not necessary. The legs should be covered by a sheet, so as to leave only the vulva exposed.

The necessity of seeing more deeply into the vagina and of medicating certain portions of the genital tract early led to the device and the use of the speculum. After the use of the *Κατοπτηρ* by Hippocrates for the purpose of rectal examination, Archigenes, Galenus, Soranus, Aetius, Paulus, Albucasis and Avicenne employed the *Διοπτρα*, a many-bladed speculum, the blades of which were separable by screws. The same device, that of opening the speculum by screws, as seen in the Pompei speculum, was utilized by P. Franco, A. Parè, Paracelsus, Scultetus and many others. Nevertheless this speculum was used by only a few physicians, and it remained for Récamier to prove its value in diagnosis. Although to-day the improvements in other methods of exploration have limited the sphere of the speculum, still the re-invention of the speculum by Récamier constitutes the first link in the chain which leads to modern gynecology. Since his day the number of variously shaped specula has vastly increased, America in particular producing a new one nearly every year. These instruments may be divided into three groups: the tubular specula, the multi-bladed, and the duck-bill.

The cylindrical speculum is most frequently used, and Récamier's had this shape. It was made of tin, seven inches long, funnel-shaped, and the ocular end was nearly twice as large as the other. To-day, conical, funnel-shaped specula are rarely used except for purposes of dilatation. The field of vision through them is limited, and they distend too much the sensitive introitus vaginæ. The cylinder instrument is in use to-day, and its internal end is either cut vertically or at an angle. Fricke has adapted a flange to the external end, whereby the instrument may be conveniently held, and the hair and labia are held out of the way. These instruments are constructed of tin, glass, hard rubber. Braun's hard rubber specula are preferable to the glass in that they are not likely to break. They are light, cheap, and through them most therapeutic agents may be used. They do not, however, illuminate as well as the glass Fergusson, which is inlaid with silver foil. Daylight is the best means of illumination, although there are a number of artificial illuminators which may be used with a reflector. The length and the calibre of the speculum must vary with the case. Too large a speculum, like Récamier's, and which West still recommends, interferes with instrumental manipulation and with proper illumination. Where the vagina is very distensible and deep, however, we must use long instruments. To allow of the touch being made through the speculum, Thomas has devised a telescopic instrument which, however, has met with little favor. Generally, the length of the speculum on its shortest side should be about three and three-quarter inches. For purposes of treatment, as we will note further on, Bandl uses very short instruments. The diameter of the speculum varies from three-quarters to one and three-quarter inches. We should aim to use as large an instrument as we can without inflicting much pain, in order to obtain as large a field of vision as possible, although displacements of the uterus and deformities of the cervix will often appear to better advantage through smaller specula.

The insertion of the cylindrical speculum is best obtained with the patient in the dorsal position, and the pelvis slightly elevated. If it is not necessary to examine the discharge in the vagina, it is advisable to administer a douche. The rectum and bladder should be emptied. The labia are to be separated by the middle finger and the thumb of one hand, and the posterior commissure made tense. The speculum is held with the pointed side downwards, between the middle finger and thumb of the other hand, the index finger being on the upper surface. The perineum is depressed by the point of the speculum, and the instrument is pushed into the lower third of the vagina, care being taken not to touch the bulb of the urethra. The instrument is then gently rotated downwards, following the curve of the canal, in order to expose the cervix. The vaginal

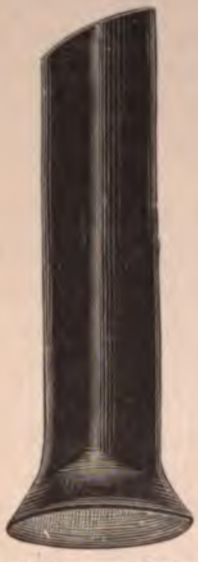


FIG. 19.—FERGUSSON SPECULUM.

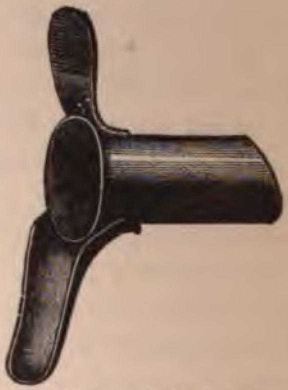


FIG. 20.—BANDL'S SPECULUM.

walls lie closely together, and as we insert the speculum we see the folds expanding, the transverse slit between them, as they unfold, simulating to the inexperienced the external os and the vaginal walls resembling the cervix.

The vaginal touch should precede the specular examination so as to determine the direction which the instrument must take, in order to expose the cervix. This is readily recognized by its shape, color, and the nature of its mucous membrane, which is smooth and without folds, that of the vagina having transverse striæ, and further the presence of the external os marks the cervix. In case of displacement of the uterus, in particular anteversion, the entire vaginal portion of the cervix is with difficulty exposed, often in the latter instance only the anterior lip. Lisfranc long ago advocated the introduction of the uterine sound, and over this the insertion of the speculum, but it is preferable to bring the cervix into the lumen of the speculum, by means of Sims's depressor, or by a tenaculum hooked in the anterior lip. Better still is it to bring the uterus into the normal position by means of the bimanual, and then to fix the cervix in the speculum by pressure exerted from without.

As the speculum is inserted, we note the state of the vagina as its walls unfold, its color, the nature of the discharge, the smoothness or roughness of the mucous membrane. When the cervix appears in the speculum, its form, size, surface are to be scrutinized. If we are using a speculum which is larger than the vaginal portion of the cervix, then we push the vaginal walls up beyond the cervix, and the organ appears larger than in reality it is. The degree to which the vaginal walls may be pushed up, shows the margin of reflexion. We should endeavor to bring the external os as far as possible into the centre of the speculum. Its borders, the state of its mucous membrane as regards erosion, tumors, etc., are examined, as also the nature of the discharge issuing from the os. Where the os is patent, we may look a short distance into the cervical canal. Pressure on the speculum may cause the lips of the cervix to roll out, and they then simulate an ulceration, but the presence of the transverse ridges, the plicæ palmatæ, and the state of the mucous membrane at the boundary line, which, when there is no erosion, is sharply marked, will correct such an error. We may frequently see the reticular tissue of the cervical mucous membrane and the openings of the ducts of the mucous glands.

The greatest advantage of the tubular speculum lies in the ease with which it may be used, and it is indispensable for resort to certain therapeutic measures, where, for instance, we desire to protect the vaginal walls, as in case of the use of the actual cautery or certain of the stronger caustic agents. Aside from the possible risk through its unskilled insertion (R. Lee, Copeland), and the fact that unless held it is apt to slip out, the instrument is inferior to other forms of specula for the purpose of many diagnostic measures. Its insertion is only followed by good results where the introitus vaginæ is relatively wide, for otherwise it distends overmuch, and in the presence of inflammatory affections or of readily bleeding new-growths its use is painful and risky. Further, it is never possible to see at one and the same time a large portion of the vagina or the cervix under natural conditions, since not only does the introduction of the instrument cause change in position of the cervix, but also because the form of the external os and the color of the mucous membrane are altered, since the speculum compresses the cervix and causes venous hyperemia of the parts which we desire to examine. Frequently the cervix, as seen through the tubular-speculum, is dark-red in color, and slight hemorrhage may result in case there exists an erosion, a hemorrhage which ceases, however, as soon as the speculum is withdrawn.

Among the tubular speculums we have still to mention those of Blackbee, Gallard, and others, which are made of wire, and through which we are able to see almost the whole vagina. The old speculum of Segalas constitutes the link between the tubular and the many-bladed instrument, since it consisted of two halves of a cylinder united by a transverse bar.

The oldest specula were multi-bladed. The speculum of Paulus of Aegina consisted of two blades, those of Albucasis, Parè, Scultetus, and that from Pompei, of three blades; later Scultetus, Heister, Lisfranc, Jobert, Ricord, Boivin, Récamiér, devised two-bladed; Paracelsus, Mauriceau, Busch, Hatin, Weiss, Charrière, three-bladed; Charrière, Segalas, Riques, Scanzoni, four-bladed; Beaumont a five-bladed, and Magonty a six-bladed. We will only mention a few of these instruments, seeing that many are only of historical interest

The simplest, in particular for diagnostic purposes, is Cusco's bi-valve, as modified by Coxeter. It consists of two half-cylinders, flattened on the surface, so that when closed the instrument resembles a beak. The outer extremities are articulated, so that when by turning the screw the inner extremities are separated, the external opening does not alter its dimensions. The instrument is inserted closed, by its least diameter, and then is turned so that the screw points downwards with the patient in the dorsal position, and backwards when she occupies the lateral position. It then lies when opened in the sagital plane of the vagina, and the blades separate largely in the fornices. By changing the position of the speculum and by opening the blades as much as possible the cervix is engaged between the blades which distend the fornices and lay bare this portion of the vagina. The Cusco speculum enables us to obtain a clear view of the cervix, but the anterior and the posterior vaginal walls are obscured by its blades. A great advantage of this speculum, as well as the instruments described, is that it is self-retaining, and that hence an assistant is not needed. Most of the instruments made after this type are too long, a blade-length of 3 to 4½ inches being sufficient. The instrument should be withdrawn with great care in order not to damage the cervix or include folds of the vagina between the blades. To accomplish this the screw is slowly loosened until the cervix escapes from the lumen of the speculum, and then, as the instrument is gently withdrawn, the screw is more and more released until, at the moment of withdrawal, the blades close.

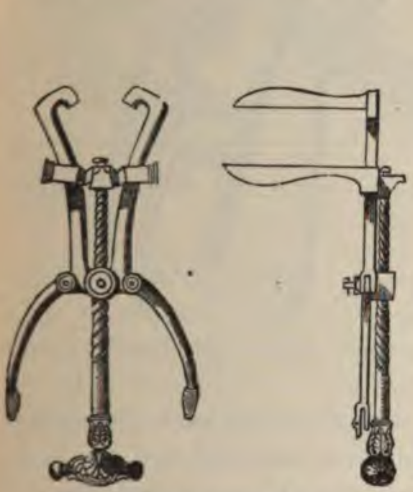


FIG. 21.—SPECULUM FROM POMPEI.

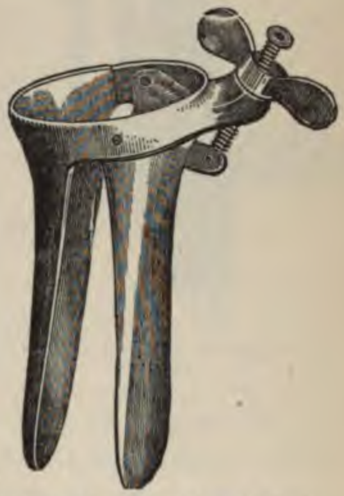


FIG. 22.—CUSCO SPECULUM. (*Hewitt.*)

The multi-bladed speculums have the advantage over the bi-valve of enabling us to see more of the vagina, but their insertion and removal is more difficult, and owing to their greater complexity it is not so easy to keep them clean. All multi-valve specula necessitate better illumination than the tubular, since their thinner blades do not reflect the light so well, but then they expose the parts more naturally, so that they are preferable, not so much for diagnostic purposes as for therapeutic and surgical manipulations on the cervix and the vagina. Among such instruments we may mention Nott's, Meadows', Bozeman's, Brewer's, Dawson's, Erich's, Massari's, Neugebauer's, etc. I have latterly been using Neugebauer's

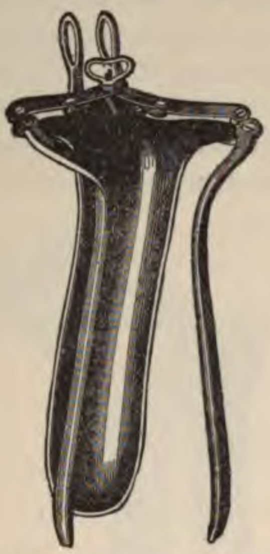


FIG. 23.—MEADOWS' TRI-VALVE SPECULUM. (*Beigel.*)

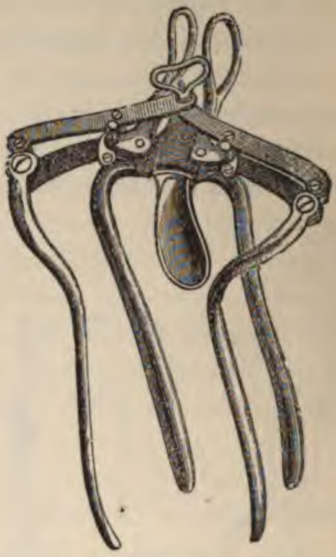


FIG. 24.—MEADOWS' FIVE-BLADED SPECULUM. (*Beigel.*)

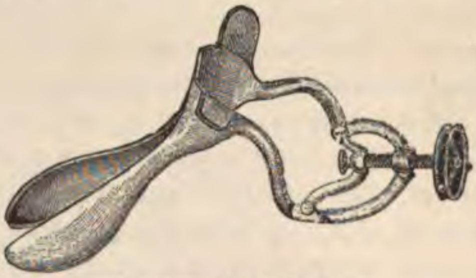


FIG. 25.—BOZEMAN'S SPECULUM.

instrument, which was devised for operations on the anterior vaginal wall, and I have found that by means of it I could readily expose the cervix and anterior wall of the vagina, and that it is self-retaining in the knee-chest position.

The use of the duck-bill speculum was popularized by Sims. The speculum *brisé* of Rècamier, the specula of Piorry, and Zang, and Neugebauer's old model, consist of a greater or less number of half-canals, which are generally only of value in that when articulated they form a funnel. By a happy accident Sims was able, in 1854, to prove that the internal genitals could be exposed after, it is just to say, an entirely novel method. He found that when the patient was in the knee-elbow position, where the intra-abdominal pressure is negative, the pulling apart of the vaginal walls enabled the air to rush in, which ballooned out the vagina and exposed the internal parts. As the result of this observation Sims devised a right-angled blade fastened to a handle, the blade having the shape of a spoon or a duck-bill. Later he combined two such spoons with a concave external surface to serve as a handle, giving us the well known instrument which is called after him. With four such blades—that is to say, with two double specula—we are in a position to examine any

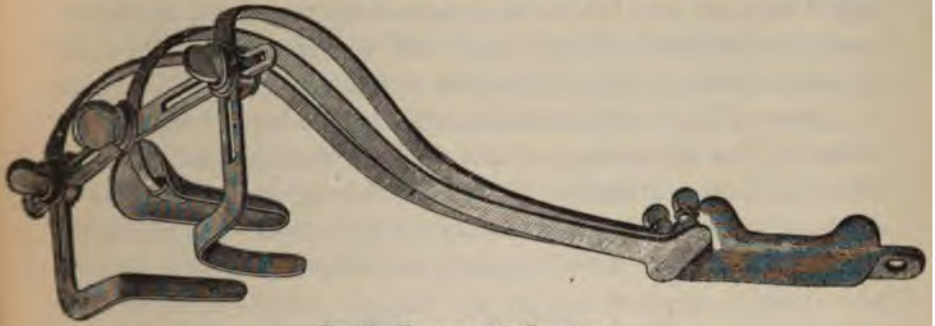


FIG. 26.—NEUGEBAUER'S SPECULUM.

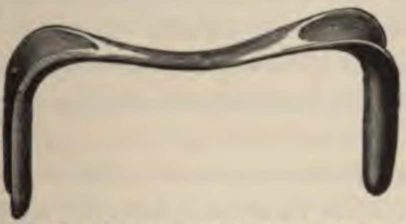


FIG. 27.—SIMS' SPECULUM. (*Hegar and Kaltenbach.*)

case. The smallest instrument is about two inches long and ½ inch wide, and is suitable for examination in cases where the hymen is intact; the largest instrument is four inches long and about 1½ inches wide, and rarely will we need a larger instrument.

Originally this speculum was used in the knee-elbow position. Since, however, this position is chiefly of value for operations on the anterior vaginal wall, and since it is an inconvenient one to assume, the instrument to-day is almost uniformly used with the patient in Sims's or the left lateral position. For this purpose the patient is caused to assume the position which we have already described, and is covered with a sheet so that only the vulva and a portion of the nates remain exposed. In case there is much vaginal discharge or we expect hemorrhage, then a towel or roll of cotton should be placed between the thighs in order to receive the discharges, which will flow downwards and forwards. The examining table should be so placed that the light will fall over the right shoulder of the examiner. The labia are then to be separated, and the well-oiled instrument is inserted into the vagina either under the guidance of the index finger of the right hand or without; the instrument should be made to follow strictly the curve of the vagina, else the point of the blade will enter the anterior fornix, and then the perineum is retracted backward and a trifle upward, the posterior vaginal wall being lifted away from the anterior, and the speculum is handed to an assistant.

[The absolute necessity of resorting to Sims's speculum, or to one or another of its modifications, for the purposes of correct diagnosis and exact therapeusis in accordance with the demands and the teachings of modern gynecology, calls for more extended reference to the instrument than is found in this and practically all other foreign works on gynecology. Even as the inventor of this speculum was an American, even so is its utility best recognized in this country, although it is only of late years that here as well the paramount value and necessity of the instrument has become uniformly granted by others than the leading gynecologists. We would claim that only through recourse to examination in Sims's position can an adequate view of the vaginal portion of the cervix be obtained, and only thus may instrumental and therapeutic measures within the cervix and the uterus be properly and scientifically resorted to. Our belief is that the gynecologist needs but two forms of specula—the one, a cylindrical for use in the dorsal position for the purpose of making applications to the vagina, and the other, the duck-bill for the purpose of diagnosis of diseases of the cervix, and for the purpose of instrumental or operative manipulations on this organ or in the uterine cavity. If these two forms suffice for the specialist, the general practitioner needs no other, and by means of these the latter just as well as the former is amply enabled to study and to treat many of the diseases of women.

Sims's speculum and its uses should be studied both from the standpoint of the specialist and from that of the general practitioner. The latter is too apt to think that because the exigencies of his practice do not necessitate the presence of a trained assistant or nurse he is unable to use the duck-bill speculum. We wish to emphasize the fact that in this opinion he is in error, since exact diagnosis and treatment may be attained and instituted through Sims's speculum and in Sims's position perfectly well without a nurse. Such being the fact we claim that the practitioner is in duty bound to familiarize himself with this instrument, for thus alone can he give the ripest fruits of gynecology to his patients. Our chief aim, hence, is to outline the means by which the general practitioner may in his gynecological work satisfy the demands of the art in its modern phases.

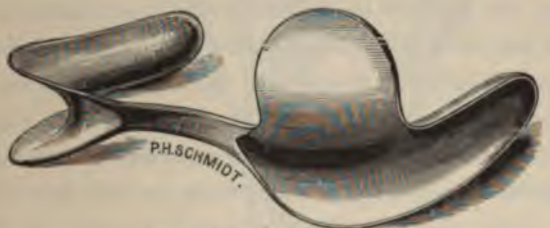


FIG. 28.—MUNDÉ'S FLANGE SIMS.

The specialist who commands the services of a trained nurse or assistant needs none of the more or less complicated forms of Sims's speculum, which aim at making the instrument self-retaining, or sufficiently so to permit of routine manipulation in accordance with modern methods. It is of advantage to him, however, to possess that form of instrument which, being supplied with a flange for the support of the upper buttock, enables his nurse to utilize the hand which does not hold the speculum in any other way he may desire. Mundé has so modified the original Sims and thus essentially improved it.

In addition to the speculum a depressor is needed for the purpose of securing proper exposure of the cervix, and a tenaculum which, when hooked into the anterior lip of the cervix, will steady the uterus, serve to draw the organ downwards if requisite, thereby straightening out its axis and facilitating the passage of the sound or the applicator.

Such is the requisite outfit for the specialist. The general practitioner needs something different, for not alone must he secure exposure of the cervix but he must be in a position to apply the diagnostic and therapeutic measures in the absence of an attendant to hold his speculum.

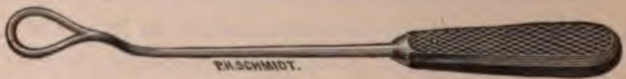


Fig. 29.—Sims' Depressor.

For him then the aim has been to construct a self-retaining speculum, and this aim has been fulfilled efficiently by a number of devices. The cylindrical and bi-valve or multi-valve specula will not answer the demands of modern gynecology, for the reason that in the majority of instances instrumental and therapeutic measures cannot satisfactorily, if at all, be instituted through them, aside from the fact that often in order to properly expose the cervix an unbearable amount of distension is necessary at the introitus vaginæ, where our patients are from the very

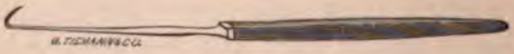


Fig. 30.—Tenaculum.

nature of things exceedingly sensitive. The instrument the practitioner needs, therefore, for use in the lateral position, is the Sims blade, made by one or another device self-retaining, and, preferably, having adapted to it a depressor which, while efficiently elevating the anterior vaginal wall, will not interfere with the field of vision, and will not distend overmuch the introitus vaginæ. With such an instrument both hands are free for manipulation, and therefore it is that we endorse it above the simple self-retaining perineal retractor, during the use of which one hand of the operator is necessarily occupied with the depressor.

There are a number of excellent self-retaining specula, with most of which we are personally familiar, and hence in a position to indorse. The simplest are those which we figure below, not necessarily because they are better than the Hunter-Erich, the Studley, etc., but because less time is requisite for insertion and adjustment.

The Darrow speculum may be taken as typical of the self-retaining speculum, without an attached depressor. It is not at all difficult to adjust, but from its rather complex construction, it requires more time than is often at the disposal of the practitioner in routine office work. For operative work on the cervix, however, in the absence of a trained assistant to hold the speculum, it is an admirable instrument.

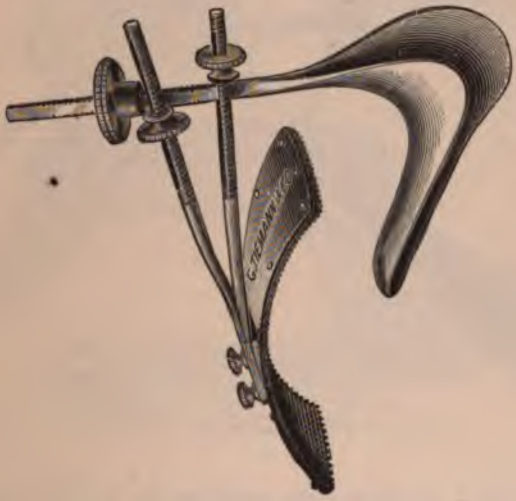


FIG. 31.—DARROW SPECULUM.

For routine office work and for minor operative work, such as curetting, the insertion of tents, etc., we can strongly recommend our modification of the Thomas-Mann speculum, which, after a thorough and prolonged test, we can endorse as sufficiently self-retaining, when used with the accompanying tenaculum, to enable the examiner alone in his office to carefully study the appearances of the cervix, to make applications to the endometrium in any position whatsoever of the uterus—in a word, to perform any manipulation proper to office practice. The perforated tenaculum is hooked into the anterior lip of the cervix, and then attached to the speculum, when, if it be desired to render the instrument self-retaining, the handle may be unscrewed, and, as we have often tested, the instrument will remain in place with the cervix thoroughly exposed.

Another self-retaining Sims, which, although we have not tested it, is highly endorsed by those who have, is the modification of Clement Cleveland. It is sufficiently described in Figs. 34 and 35, while in Fig. 36 is seen the belt which holds the instrument in place. This instrument, owing to the angle at which the constituent blades are placed, occupies *in situ* a position nearly analogous to that in which it is held by a trained nurse—that is to say, the blade retracts the perineum not only backwards, but slightly upwards, and we thus obtain the best possible view of the cervix.

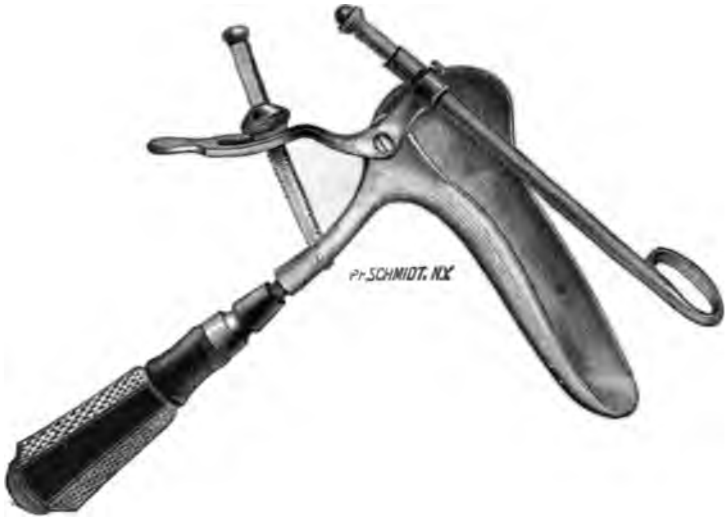


FIG. 32—THOMAS-MANN SIMS. (Modified.)

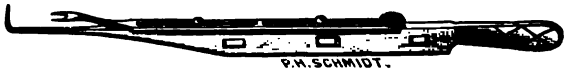


FIG. 33.—FORKED PERFORATED TENACULUM.

The thus described instruments, which are given as types of what

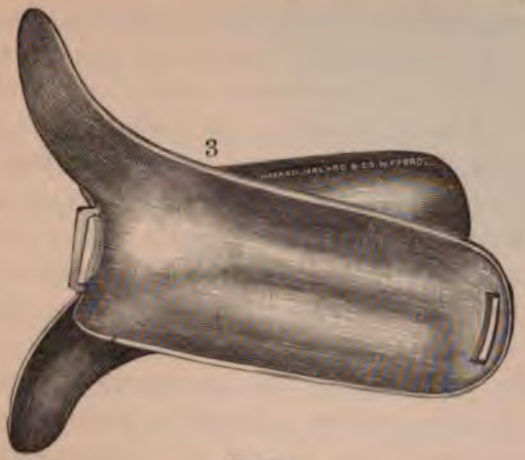


FIG. 34

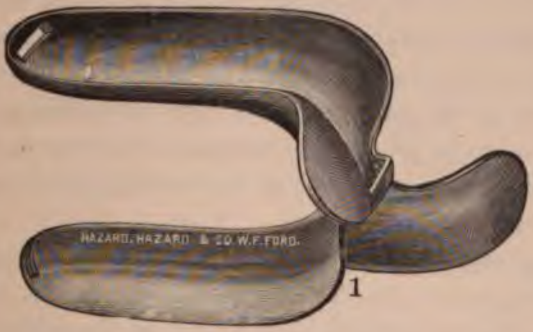


FIG. 35.

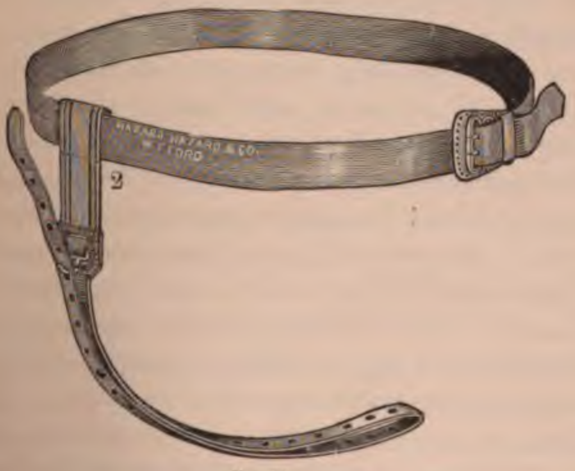


FIG. 36.

the general practitioner may use in order to efficiently treat his patients, are ample for this purpose. It is but just to state, however, that with the exception of Cleveland's modification, these instruments cannot completely take the place of the hand of the trained nurse, for the reason that they do not give us that upward twist to the blade which is advantageous if not essential. The point on which we lay stress, however, is that rational treatment and exact diagnosis may be reached and instituted by the general practitioner through one or another of these modifications, as they only exceptionally can through the cylindrical, bi- or multi-valve instruments.—ED.]

Occasionally, as soon as the labia are separated, but ordinarily only when the recto-vaginal septum is retracted, the air rushes in and we see the anterior vaginal wall rise and fall synchronously with respiration, and in the field of vision appears the cervix, or when this organ is directed greatly backwards only the anterior lip. The cervix is, in such instances, to be exposed by traction exerted by means of a tenaculum hooked in the anterior lip, and such manipulation should only be resorted to under the guidance of the eye or the fingers, else the instrument may be hooked into a fold of the anterior vaginal wall instead of into the cervix.

Where the speculum is too small, or the anterior vaginal wall relaxed, this wall prolapses in the field of vision, and must be elevated by the depressor, which instrument, when placed in the anterior fornix, also serves to fix the vaginal portion of the cervix, or else both the depressor and the tenaculum may be used and held in the same hand.

By means of this speculum, the use of which has not as yet become generally popularized, we see the parts which we seek to examine under approximately normal conditions, only we must take into account the change in the position of the uterus, the result of the manner in which the body of the patient lies. The anterior vaginal wall and the vaginal portion of the cervix are seen under normal conditions in regard to shape, color, and length, provided, by traction through the tenaculum, we have not caused partial inversion of the vagina; the examination by means of the finger and the sound may be readily resorted to, and the use of the latter is simplified, and for the purposes of the majority of therapeutic manipulations, as well as operative, sufficient space is obtained, and further still, by hooking a tenaculum in the posterior lip as well, we may draw the two apart and inspect a portion of the cervical canal. The posterior vaginal wall is alone unexposed, being covered by the blade of the instrument.

For many purposes, however, this speculum lacks utility. For douching the cervix, for the application of the cautery and of strong caustics, the tubular speculum is far better in that the vaginal walls are protected by means of it. The greatest objection, furthermore, to this method of examination, is the fact that the presence of a third party is requisite, and this it is which interferes with the general use of Sims's speculum. In hospital practice this objection does not hold, but in private practice we have to contend against the patient's objection to the presence of an assistant, even though a female, and, further, it is inconvenient always to take one with us.

[These objections should not for one moment hold, even if we had not shown that it is perfectly possible to dispense with an assistant, in view of the manifold advantages resulting from the use of Sims's speculum. Gynecology without Sims's speculum resembles the play of Hamlet without the chief character, and the instrument is nearly as essential in the treatment and diagnosis of diseases of the uterus, as is the modern mirror in case of diseases of the larynx.—Ed.]

For this reason the endeavor has been to construct instruments which are self-retaining, such as those of Emmet, Pallen, Thomas, Foveaux, Baxter, Byrne and others, but they are mostly so complicated that they have practically remained useful only to the special inventor.

On account of its simplicity and the fact that it may be bent, the wire speculum of F. H. Brown, of Boston, is worthy of commendation. It is a skeleton Sims, and is constructed of wire, which, however, must be stout enough not to yield to the necessary traction. This speculum has the further advantage of not covering the posterior vaginal wall, and of distending it sufficiently for even plastic operations; still the field of vision is less extensive than when the large, concave Sims is used.

Simon and Ulrich have devised similar spoon-shaped instruments for use in the dorsal position. These instruments do not differ essentially from the above-described Sims, but in their manner of application. They consist of a single blade, to be had in varying sizes, attached to a suitable handle. Even as any of Simon's specula may be used for examination in the lateral position, so could Sims's in the dorsal, were it not for the fact that the second blade interferes with the position of the patient, and, further, does not give sufficient space for the hand of the assistant which holds it. Since in the dorsal position the anterior vaginal wall sinks downwards, it is almost always necessary to lift it up either with one of Simon's blades, or else with a broad, flat blade, bent on a handle. In addition we need lateral separators (Fig. 38), constructed of metal, flat, and bent at a right angle to the handle, in order to keep the lateral walls from falling forwards. For plastic operations on the posterior vaginal wall, Simon also had constructed fenestrated specula, of special utility in posterior colporrhaphy.

In case we use a table with foot rests, we may examine with one assistant, provided the lateral retractors are not needed. But if the feet must be held and side retractors used, then at least three assistants are needed, one for each lower extremity and side retractor, and the third for the speculum. The latter must be accustomed to his work, else the play of the hands of the examiner or of the operator will be interfered with, and the vagina irregularly distended, the cervix dislocated or hidden. In order to dispense entirely with assistants, Ulrich, as also Neugebauer, have devised, for operations on fistulæ, very complicated apparatus, by means of which the lower extremities and the pelvis are immobilized, and to which the specula, lateral retractors and the tenacula may be attached. On account of their complexity, the apparatus has never become popularized.

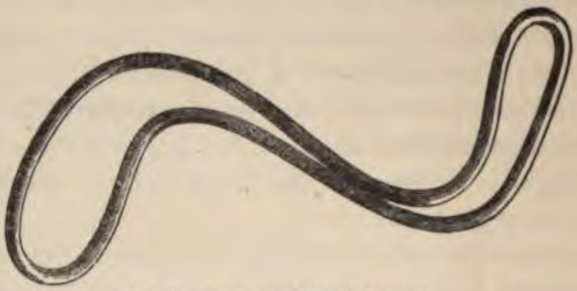


FIG. 37.—BROWNE'S WIRE SPECULUM.

In order to use this speculum the patient assumes the dorsal position, with the nates at the very edge of the table, the pelvis more or less elevated, according to the necessities of the manipulations, the lower extremities sharply flexed and held by assistants. The well-oiled speculum

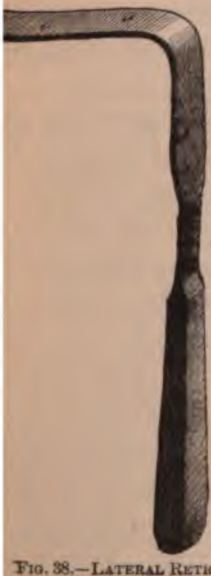


FIG. 38.—LATERAL RETRACTOR.

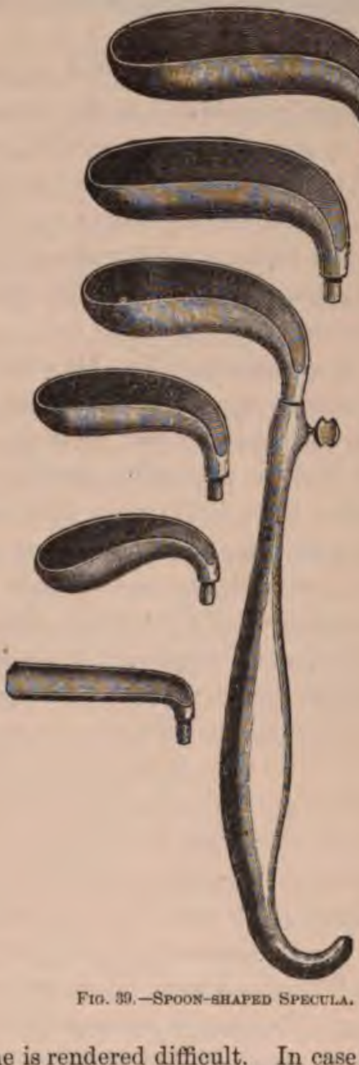


FIG. 39.—SPOON-SHAPED SPECULA.

nserted into the vagina, the posterior commissure being transversely
tched. The size of the speculum should correspond to that of the
ina. If the blade is too long, the uterus is pushed upward, and if it
too broad the vagina is distended transversely overmuch, and the ex-
ure of the parts we wish to examine is rendered difficult. In case the
rus is retroverted, a very short blade must be used, since otherwise the
der of the speculum will hold down the posterior fornix, and thereby
uterus. When the proper speculum has been introduced, it is pulled

directly downward; forward traction favors slipping of the speculum during the examination, and an anterior elevator is inserted, both of which are handed to an assistant, who must hold them steadily as far apart as possible, at right angles to the vertical line. In case the lateral vaginal walls sink into the field of vision, they must be held apart by the insertion of the lateral retractors.

The previously described spoon-shaped specula, with bent handles, are hardly applicable to the dorsal position. In case of necessity the Simon speculum may be steadied by passing a sling over the hook at the end of the handle, in which the foot of the operator or of the assistant is placed, and the instrument may thus be drawn downwards. It is self-evident that such a blade should be chosen as forms somewhat more than a right angle with the handle, since a speculum of lesser curve readily slips out of the vagina.

It is undeniable that this method of specular examination has certain advantages over the latero-abdominal. We are able the better to administer chloroform, we may see the greater portion of the anterior wall as well, and if we use fenestrated specula the posterior vaginal wall, and we may further more readily make fluid applications; still the method requires many more assistants, and cannot be utilized in any other position. For this reason the latero-abdominal position is preferable for purposes of examination and for resort to certain lesser operations. For complicated manipulations—especially, of course, for those on the anterior and the posterior vaginal walls—the dorsal position is unquestionably of advantage.

To steady the cervix in the speculum, or to draw down the uterus, to lift away folds of the vagina, we may use Sims's tenaculum, or a depressor, or the double tenaculum to be described later. To gain space we pass a ligature through one or another lip by means of a strongly curved-needle, or through both lips, and the ends of the ligature may be fastened to the speculum, thus steadying the uterus.

If it has not been previously done, then before inspection of the cervix and the vaginal walls, the secretion, blood, pus, or mucus, must be wiped away. This may be accomplished by cotton held in long dressing-forceps or in a sponge-holder, or wrapped around a grooved rod. If the secretion is very thick, like that of the cervix, it is often necessary to dip the cotton in an alkaline solution before application, and thus the mucus is dissolved.

In addition to the direct information obtainable by sight, we may also ascertain the dimensions of the vaginal portion of the cervix. The length may be ascertained by means of the finger or measuring rod, and the circumference by passing a loop around the organ.

A short time ago Levy utilized the speculum in order to obtain plaster casts of the cervix and of certain portions of the vagina, and from these casts, he claimed, extra- and intra-uterine pessaries could be shaped. These casts also enable us to ascertain the dimensions of the vagina, and to note the changes effected by the use of iodine, electricity, etc. To obtain the casts of the cervix, the organ is exposed through a cylindrical speculum, its surface well oiled, and then plaster of the consistency of thick syrup is poured through the speculum around the cervix. In a few minutes the plaster hardens and the cast is removed with the speculum, whence it is extricated after it has become thoroughly hard.

Through any speculum, provided it does not press the lips of the cervix together, we may see a short distance into the cervical canal when the os is patulous, and the more readily if we pull the lips apart by a couple of tenacula. In order to see more deeply into the cervical canal or to make local applications, we must use an endoscope or one or another of the intra-uterine specula. Although different instruments of this nature have been devised by Atthill, Peaslee, Jobert, Mathieu, Boiserez and others, generally for therapeutic purposes, and although certain observers report good results from their use, as, for instance, Pantaleoni, who, through the Desormeaux instrument, removed a small polyp from the uterine cavity, still this method of exploration has not become popular, and in its place are substituted dilatation and the curette.

For the inspection of the cervical mucous membrane up to the internal os, the most convenient instrument is Grünfeld's endoscope, which can be had in different sizes, and consists in a short cylindrical tube, with blackened internal surface. The inner extremity is cut off straight or obliquely, and is either open or with a glass window. Other tubes are fenestrated to enable the examiner to inspect the cervical mucous membrane. The source of illumination of the field of inspection should be artificial by means of a reflector. The instrument is best inserted with the patient in the left lateral position, after thorough exposure of the cervix. When introduced slowly, we may examine the entire mucous membrane, and at the end of the cavity we find a central depression, the borders of which are smoothly covered by mucous membrane, and this is the internal os, through which the endoscope may generally only be passed after dilatation.

The method requires, even as does the endoscopic examination of the bladder, considerable experience in order to be able to properly appreciate the conditions seen. It has proved serviceable to me in case of polypi, fissures and diseases of the mucous membrane of the cervix.

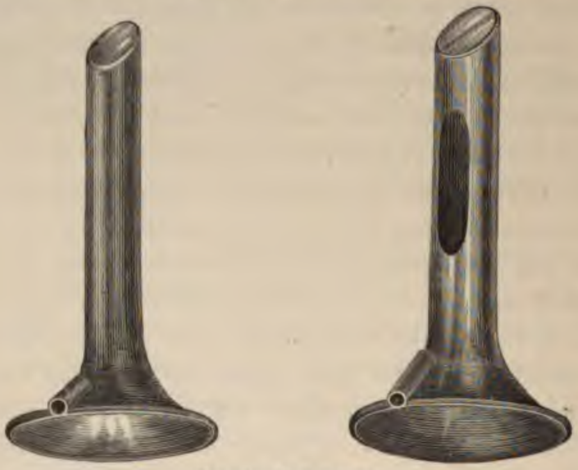


FIG. 40.—ENDOSCOPES.

Much more difficult, and yielding less satisfactory results, is the endoscopic examination of the uterus, which has never yielded me results worth speaking of, as also the method which aims at illumination of the pelvis (diaphanoscopic examination of Schramm). Possibly when we attain more powerful means of illumination by electricity, these methods may be of greater value, but as yet the different apparatus which have yielded good results in other parts of the body, have not proved an advance in our method of gynecological diagnosis.

CHAPTER XII.

THE DILATATION OF THE GENITAL TRACT.

A NECESSARY preliminary to resort to any of the methods of internal examination, is the patency of the part of the genital tract which we wish to examine. The vaginal touch and the speculum require a certain degree of dilatability of the vagina and of its introitus, and the use of the sound necessitates permeability of the uterine orifices. Atresia and the like of the introitus, and of the vagina, as well as the treatment, will receive ample consideration under the subject of the special affections of these parts, and we content ourselves here with the statement that often for the purposes of careful diagnosis we must subject our patient to preparatory dilatation of the vagina and of its inlet. Aside from abnormalities in these parts, we meet with obstacles to examination, due to a short, non-distensible vagina. We obtain assistance in these cases by means of the persistent tamponade of the vagina, or by means of the colpeurynter, as Hegar advises, or by the use of a hard rubber or glass tube (like that of Ulrich, or Sims, devised for dilatation preparatory to the operation for urinary fistulæ), or else by the insertion of Bozeman's oval or cylindrical vaginal dilators. By means of such methods the vagina

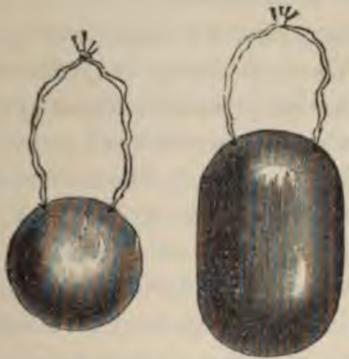


FIG. 41.—BOZEMAN'S VAGINAL DILATORS.

is distended, its walls become softened, and cicatricial bands may even be caused to disappear. The tampons or the dilators are removed at the end of twelve to twenty-four hours, and the examination resorted to at once, bearing in mind the displacements of the pelvic organs and the changes in consistency caused by the distending process. (Hegar.)

For the proper examination of the uterine cavity the sound frequently is not sufficient, and it is generally impossible to push the finger in. We may often explore the lower part of the cervical canal, especially at the menstrual period and a few days after, but the internal os is generally patent for the finger only in cases where it has been dilated by the passage of tumors, or other contents of the uterine cavity. Ordinarily it is necessary to resort to dilatation of the orifices of the uterus, and of the lower segment of the organ, before we can examine digitally.

In 1844 Simpson introduced compressed sponge tents for purposes of dilatation, and this method has been universally used, although of late years the use of the curette without precedent dilatation has narrowed considerably the sphere of the tent.

The most common indication for dilatation of the uterine cavity is the existence of new growths in the uterus, or symptoms suggestive of their presence. The conjoined examination, and that by the sound, often yield negative results, and when we thus detect a tumor, its connection with the uterus and its quality are often in doubt. Ordinarily, from the subjective symptoms, hemorrhages, watery discharges, pain, together with the evidence of enlargement of the uterus obtained by the bimanual and the sound, and the patency of the external and the internal orifices, there is suggested the presence of a foreign body, a fibroma, polyp, remnants of secundines, an adenoma, sarcoma, or the rarer carcinoma. Frequently examination by the sound gives results which call for dilatation, as where the instrument meets with some obstacle, feels tumors or roughness of the mucous membrane, and the dilatation leads to an examination whereby we differentiate between new growths, inflammatory processes of the endometrium, such as circumscribed swelling, polypoid or fungous vegetations, etc.

The uterus, however, is not dilated only in order to permit digital exploration, but also, and much more frequently, in case of narrow orifice or stenosis of the cervix, whether congenital or else due to inflammatory processes or to flexion, in order to allow of the introduction of instruments, such as the endoscope or the curette, to allow again the application of medicaments or the injection of fluids into the uterus, and lastly in case of amenorrhea, dysmenorrhea, or sterility. Schultze further advocates dilatation before attempting reposition of the retroflexed uterus.

Dilatation of the uterus, hence, may be for purposes of diagnosis or of treatment. In the first instance it must be sufficient to allow the easy passage of the finger, in the latter it need not be so extensive. Dilatation may be obtained in a number of ways, non-surgical (bloodless), and surgical (bloody). In the first category are ranged the tents, bougies and dilators, in the second discission of the cervix.

I. Non-surgical (bloodless) Dilatation.

For the purpose of dilating the cervical canal by expansile substances, Rodericus a Castro, although not with diagnostic intent, used the roots of gentian, aristolochia, bryonia, cyclaminis, etc.; but of the different agents which have been recommended and used, only three are to-day found useful: sponge, laminaria and latterly the tupelo.

Simpson's directions were to prepare the tents from thoroughly cleansed sponges, cut into a conical form, of varying size, and about the length of a finger. The cones were dipped in a solution of gum arabic, and then tightly wrapped with a stout string. As soon as they were thoroughly dried, the twine was unwound, and the surfaces made smooth by sandpaper. To guard against the foul smell which the cone assumes from absorption of secretion, they were impregnated with deodorizing substances, such as carbolic (Ellis), permanganate of potass (Aveling), etc.; but these agents have been found to render the sponges brittle, so that on removal a piece may be left behind. Latterly, on Bantock's recommendation, the cones are prepared with wax and oil, and the search is ever towards making them thoroughly antiseptic. Before use, the cone should be rubbed over with iodoform, and in the Vienna general hospital, the tents are thoroughly iodoformized during their manufacture, and I am in the habit of using only sponge tents prepared in this way.

In order to guard against the abrasion of the tissues by the tent, Ward, Massari, Ingfort, Emmet, and others, have advocated inserting it in a rubber bag or in a gold-beater's skin. Through the large end of the cone a string is passed to facilitate removal. This string, however, is a fruitful source of infection, and I am, therefore, accustomed to dispense with it, or else to substitute a piece of fine silver wire.

The tent is inserted through a valvular speculum with the patient in the lateral or the dorsal position. But both the vagina and the uterus must first be carefully cleansed, and I am accustomed to insert an iodoform pencil into the uterus. The cervix is to be drawn down and steadied by a tenaculum hooked in one or another lip, according to the position

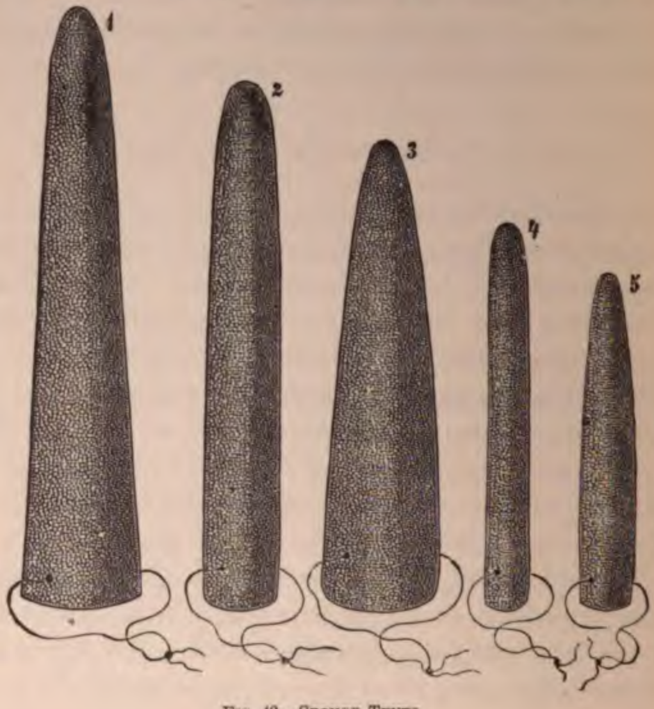


FIG. 42.—SPONGE TENTS.

of the uterus, and the tent is passed as far as possible into and beyond t cervical canal. The insertion may be accomplished by means of a curved dressing-forceps. As a general thing, the mistake is made in t choice of too large a size, the result being that the tent does not pa through the internal os, and only the lower part of the cervix is distende The entire manipulation is thus complicated, because, when we endeav to insert the next tent, we find that the internal os is still more contract as the result of the reflex irritation of the first. It is, therefore, the ru to choose at the outset a long and thin tent which will pass at on through both orifices of the cervix. The tent should, further, not be inserted too deeply, but its base, with the transfixing string, should project below the external os. Otherwise the lips of the cervix may close over the tent, and its removal will be a very difficult matter, indeed it may be necessary to incise the external os. For the insertion of the tent the tubular speculum is not useful, since it presses the lips of the cervix together. The Cusco speculum, or the multi-valve may be used.

When the external os is not too narrow, or displaced overmuch anteriorly or posteriorly, then the tent may be readily inserted, guided simply along the finger with the patient in the lateral or the dorsal position. The tent is grasped in the forceps or impinged on a conductor, is pushed into the cervical canal, held there by the tip of the finger, and the conductor is withdrawn. We next seek to direct the tent in the axis of the canal, and it is pushed deeply in, the hand on the abdomen making counter-pressure. Seeing that the majority of tents are perforated throughout their entire length, we must be careful lest the conductor slip through the tent, and thus injure the uterus. The thinner the sponge tent and the greater its absorptive powers, the more quickly must we insert it, since otherwise the apex becomes soft and swollen, and we will be unable to insert it through the narrow os. It is further useful when inserting the tent without the speculum, to steady and draw down the uterus by a tenaculum fixed in the cervix. When the tent has been pushed into the uterus and the conductor has been removed, the finger should remain in the vagina against it until we are satisfied it will not slip out. Such a method is preferable to inserting a tampon. In case we aim at complete dilatation then the patient should remain in bed, but this is unnecessary when we only wish slighter dilatation, and the tent will be left only a few hours.

A few minutes after the insertion of a sponge tent, its surface becomes roughened, its diameter greater. The longer it remains the more it distends, its fibres penetrating the folds of the cervix and the ducts of the mucous follicles. After the lapse of a few hours, the cervix becomes softer, more succulent, indurations in its tissue melting down and disappearing, the imbibition of serum extending to the body of the uterus, and frequently there results from the arterial hyperæmia an erection of the uterus similar to what we meet with previous to menstruation. These phenomena are accompanied by a number of subjective disturbances. The distension of the muscular structure of the uterus at the level of the orifices, awakens contractions which may be of a very painful nature, and occasionally result in premature expulsion of the tent. There is usually present a more or less serous discharge, tinged with, or even consisting of pure blood. As long as the pains are of the nature of contractions, and there is no fever or tenderness, the sponge may be left in the uterus, or we may resort to further dilatation. But if fever sets in, and the thermometer should be used to detect it, or if the pain is constant, or if there is tenderness, then it is safer to remove the tent at once, and desist for a time from attempts at dilatation, unless there is urgent call for examination. We frequently meet a uterus which reacts readily against dilating measures, and yet at the second attempt will bear it very well.

We may counteract the foul discharge, and in a measure the dangers resulting from it, by administering every four to five hours during dilatation an injection of a solution of permanganate of potass., carbolic, or other agent.

A sponge tent should never be left *in situ* longer than twelve hours. It must then be removed and replaced by another, provided we have not obtained sufficient dilatation. During its removal, and before the substitution of another, a disinfecting douche should be administered. The second tent must be larger, not only because it must dilate more extensively, but also because it must be inserted more deeply, since ordinarily it is not the internal os but the lower uterine segment above it—the so-called isthmus of the uterus (Spiegelberg)—which is the narrowest part of the entire organ. Sometimes two to three tents and again five to six are needed to secure sufficient dilatation.

The removal of the tent is accomplished either through the speculum or else in the elevated dorsal position, which latter is advantageous for the after-examination, since it permits of the more ready resort to the bimanual. The string through the tent is seized in one hand, and a finger of the other hand is inserted into the cervix between the sponge and the cervical wall, and we endeavor by means of gentle oscillatory movements, even as in the removal of the placenta, to loosen the tent from its frequently firm connection with the tissue of the cervix. (Sims.) Generally we are thus able, without hemorrhage or injury to the mucous membrane, to extract the dilating agent, and to penetrate at once into the uterine cavity. In case the sponge or the string tears, then a thin dressing forceps or a double tenaculum is made to grasp the sponge, and by gentle traction it is removed. Often, especially when the tent has not been left *in situ* long enough, the internal os or the isthmus of the uterus contracts so speedily after removal, that the finger cannot at all or only with effort be made to pass.

Pediculated and small sub-mucous tumors, as the result of the contractions induced by the tent, will frequently have been driven down against or into the cervix, so that the examining finger readily reaches them; in case of large tumors, and great thickening of the walls of the uterus, due to inflammatory affections, or to polypoid or sarcomatous degeneration of the mucous membrane, it is impossible to examine the entire uterine cavity, and in case of great depth of the cavity it may be impossible, notwithstanding the degree of dilatation, to reach the fundus. In case the uterus is movable, then by pressure from without, exerted by oneself or an assistant, we may press it down somewhat; and exceptionally the tissues of the uterus are so soft that by considerable pressure the vertical axis of the organ may be greatly lessened. We may then, in case the genital passage is not narrow, and there is not an excess of adipose, penetrate to the depth of about five and a half inches and reach the fundus.

The examination of the dilated uterus often necessitates the use of great force, especially in fat patients. In case the finger can pass the isthmus, however, then through resort to the different combined methods of examination, we are able, seeing that the finger is gloved, so to speak, by the uterus, to bring any part of the uterine wall between the combined fingers, and thus to recognize not only the site, origin, size, configuration, movability and consistency of new growths, but also the state of the mucous membrane.

When the examination has been completed, we resort at once to careful disinfection, or, when necessary, to some surgical or therapeutic measure. A certain time is requisite before the uterus will return to the normal. Although the isthmus, the internal os, and later the external, close quickly, they remain for a number of days more patent than they were at the outset, and the succulency of the tissues lasts for twenty-four to thirty-six hours. It is advisable, even when the dilating measures have caused no disturbance, to keep the patients quiet in bed for a day at least, and for a number of days to guard them against exciting causes.

Only exceptionally can extreme dilatation and the after-examination be resorted to without anesthesia. The entire procedure is generally very painful, and, besides, narcosis makes easier the bimanual palpation. It is advisable, then to anesthetize, since we cannot know at the outset whether the examination is going to prove easy or difficult.

The many disadvantages accompanying the use of the sponge tents, such as their high price, the injury to the mucous membrane consecutive to their use, the difficulty in inserting them, the readiness with which the secretions decompose and the resulting dangers, have caused us to seek for a new absorbent dilating agent. In 1862 Sloan introduced the laminaria tent into gynecology, and it was quickly adopted by C. Braun, Simpson, Kübler, Hegar and Kaltenbach, Schultze, Ahlfeld, Martin, Fehling and others. Still to-day it has not entirely displaced the sponge tent. The sea-tangle or laminaria tents are of varying thickness, of moderate hardness, solid or perforated. (Greenhalgh.) Their dilatability varies according to whether they are freshly made or not, but they are much slower in action than the sponge, although with greater intensity. The perforated dilate more quickly than the solid, although not to as great a degree, and the dilatation is much more in the transverse than in the vertical axis. Either a large tent may be inserted or a number of thin ones bound together in a bundle by a rubber band.

When a laminaria tent is placed in water it becomes softer and increases in size, so that we may bend it to any desired curve, but it also loses some of its alkali by which foul discharge is counteracted. When the tent dilates, it loses its cylindrical shape, and becomes angular. It may again be dried, however, smoothed off and again used, of course only if it has been placed in water, and not after having been used for purpose of dilatation. Laminaria can be made aseptic, as Schultze first pointed out. I am in the habit of placing the tent in a 5 per cent. hot solution of carbolic, and in a few minutes after it has softened a trifle I bend it to the curve which the use of the sound in the given case teaches me it must have. If it be next placed in cold carbolic, it will retain the curve given to it. The possibility of giving the tent any desired curve is an advantage which the laminaria possesses over the sponge tent.

Before inserting the tent, the vagina, and when possible the uterine cavity also, should be thoroughly disinfected, the direction and width of the uterine canal determined by the sound, and the contra-indications, ch we will shortly mention, to the use of any tent sought for. For insertion, even as in case of the sponge, and more readily without the ulum, since the laminaria distends slowly, a dressing-forceps, or a alled laminaria-carrier (G. Braun, G. Mann), or a simple stylet may ised. For the purpose of ready removal, a string is passed through lower extremity of the tent. Since the laminaria distends very ly, and is smooth and slippery, it readily falls out of the cervix. It herefore, advisable to use tents which have been previously dilated

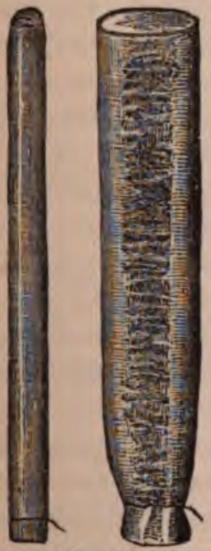


Fig. 43.
INARIA Tent. The same Distended.

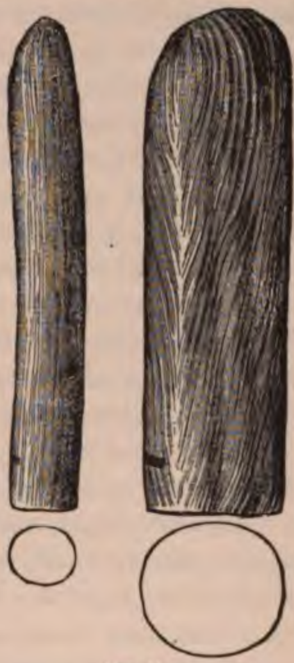


Fig. 44.
Tupelo Tent. The same Dilated.

then dried, and to hold the tent in place by the finger, until we are ain that it will remain *in situ*, for a tampon is an uncertain means of tion. The laminaria may remain longer than the sponge, although ould be changed twice in the twenty-four hours.

The root of the gentian, recommended by Winckel, in 1867, has no antages over the laminaria. It is chiefly advocated on account of its apness. In case it is deemed advisable to impregnate tents with dicaments as is urged by Winckel, Kristeller, Nott, Thomas and ers, then the gentian tent is a good one to use.

Since 1883, the tupelo tent, recommended by Sussdorff, Landau, Mundé, Elischer and others, has been used more than sponge and laminaria. The tupelo is the root of the *nyssa aquatica.* It is light when dry, having a specific gravity of 0.16, and it readily absorbs a large amount of water. If dried again after having been distended, it will not resume its original volume. It is readily compressible, by mechanical means, and it is then cut into various lengths and thicknesses, to a cylindrical shape, and its surface is carefully smoothed.

The compressed tupelo tent dilates quite rapidly, but to a considerably less degree than the sponge, but then, if carefully prepared, it is not so likely to become foul, and not a single case of sepsis after its use has been reported, where the necessary precautions were taken. The tupelo cannot, however, like the laminaria, be impregnated with medicinal substances, seeing that when once it has become distended it cannot be caused to return to its original size. Still, it may be covered with iodoform before use, and in all other respects the tupelo has all the advantages of the sponge and the laminaria without their disadvantages, so that the preference shown for it is certainly justified.

This tent is inserted even as is the laminaria, although it must be removed oftener, since it distends more quickly.

A consideration of the properties of these different tents teaches us the indications for resort to the one or to the other. The sponge tent dilates much the quickest, but it is far less readily inserted without the speculum, it attaches itself, however, very speedily in the cervix. It dilates to a much greater size than the laminaria, but with far less intensity; it is less likely to overcome any great obstacle, but then it induces greater softening of the tissues and congests them more, which alone secures sufficient dilatability of the cervical canal; it connects itself intimately with the cervical mucous membrane, however, its superficial radicles extending into the depressions in the mucous membrane, and thus, while it cleanses the canal far better than the most careful wiping out can do, it still injures the mucous membrane, causes hemorrhages to a greater or less degree, and offers in consequence great facilities for absorption of septic material.

The laminaria tent being harder, distending more slowly, having a smooth surface, is readily introduced, and just as readily slips out; it injures the mucous membrane to a less degree, but then it causes fewer of the local alterations in this membrane than does the sponge; seeing that its co-efficient of distension is greater it excites greater contractions, and is not able in a given time to render the canal so patulous as the sponge, in particular since it does not cause so much softening and serous imbibition in the tissues of the cervix; it does not, however, cause such a foul discharge as the sponge.

The tupelo tent ranks between these two: it dilates more quickly than the laminaria, and less so than the sponge, and its surface being smooth it cleanses the cervical mucous membrane less readily than the latter.

For the above reasons, in general, the laminaria and the tupelo should be chosen in cases where there is narrowness of the external or internal orifices, especially in case of flexion, where it frequently is impossible to pass the sponge around the angle, and also where the cervix is rigid and hard.

[The tupelo tent as at present prepared by reliable makers, is in most respects preferable to either the laminaria or the sponge. Its sphere of dilatability is ample for every purpose of exploration and of treatment, and the absolute immunity from sepsis which it brings should render it more popular than it has as yet become. From our experience we can state that the tupelo, while dilating efficiently, never wounds the tissues of the cervix to such an extent as the laminaria and the sponge, and distends as equably as the latter, and much more so than the former. The chief objection indeed to the laminaria is the fact that it is very likely to distend the least at the very point where dilatation is most requisite, that is to say at the level of the internal os, as is well shown in the annexed figures taken from Mundé.

The only advantage, indeed, which the laminaria possesses over the tupelo, is the fact that it may be bent to any desired curve, and hence may more readily be passed in case of flexion; the cases, however, are very exceptional where the tupelo cannot be used. Furthermore, it should be a cardinal rule never to insert a second laminaria, above all a second sponge tent, immediately on the withdrawal of the first. The risk of sepsis from disregard of this rule, is great. The tupelo tent is under no such restriction, and this is a decided point in its favor.

As for the sponge tent, popular as it still is with the general practitioner, we grant but two conditions in which it should be used. The first is a therapeutic indication, where we desire to stimulate the uterus (as in amenorrhœa) and where we desire to soften down the organ, as in hyperplasia. The second is a diagnostic indication, to differentiate between the hard variety of cancer, and a high grade of hyperplasia of the cervix. The sponge tent will affect dilatation in the latter instance, and scarcely at all in the former. In each and all of these conditions, the wise and the safe rule is to be content with the amount of dilatation obtained by the first tent, and not to follow it up with a second.—ED.]

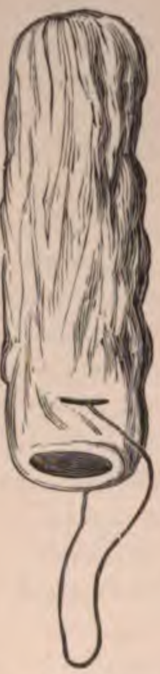


FIG. 45.—LAMINARIA TENT DILATED WITH WATER.

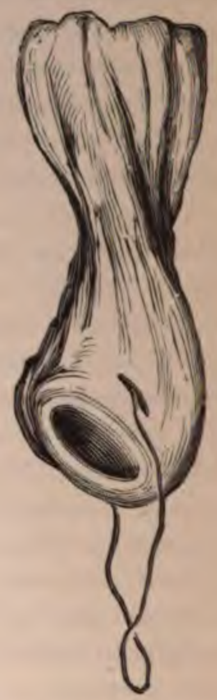


FIG. 46.—LAMINARIA TENT DILATED IN UTE SHOWING CONSTRICTION BY INTERNAL OS.

The use of any variety of tent carries in its train a number of risk whence it is necessary never to resort to one without bearing in mind th strict indications and contra-indications. The pressure, the rupture which follow on the use of the tent, the mechanical or chemical injurie caused by the laminaria, and even by the sponge charged with disinfecting substances, the damage to the mucous membrane, and above all the risk of infection from the sponge, such are the sources of danger lurking in tents. Inflammations of the mucous membrane, metritis, parametritis, perimetritis, fatal peritonitis, have frequently enough occurred from absorption of the decomposed secretion, and there are instances on record of more or less rapid septicæmia with fatal termination.

Thomas lost a case after the use of a sponge tent from tetanus; in four other cases he witnessed inflammatory affections; Hildebrandt lost a patient from septicæmia, as also Olshausen. Instances of severe or fatal illnesses have been further recorded by Anderson, Blix, Sims, Grünewaldt, Winckel, Künecke, Zschiesche, Pernice, Aitken, Scanzoni (after the use of laminaria), and others.

In the days before the introduction of antiseptics, I have often seen metritris and parametritis follow on the use of the sponge tent, and not more seldom after the use of laminaria. The majority of these instances were slight, however, and I have seen death in one case, where the treatment was directed against sterility, and where a portion of the tent having been left in the uterine cavity, there resulted parametritis, which ended in death at the expiration of a year. Since careful resort to antiseptics, I have never seen other untoward phenomena than pain, and in one instance such great contraction of the cervix as to necessitate incision of the organ in order to remove the laminaria tent. Schultze, in over 1000 dilatations by means of laminaria, only witnessed five instances of slight parametritis.

The use of tents, in particular the sponge, is especially risky in the presence of great lesion of the mucous membrane, especially after recent wounds, where the conditions for absorption are most favorable. Contrary to the recommendation of many authorities, E. Martin for example, we would forbid incision of the cervix before the insertion of the sponge tent. This is often done and the wonder is that more cases of putrid absorption are not recorded.

At the menstrual period dilatation is accomplished most readily and quickly, but at this time there is risk of the occurrence of hæmatocele, as I saw in two instances, and the chance of absorption is greater, owing to the higher degree of congestion of the uterus. In case we can choose our time, it is preferable to dilate a few days after the cessation of menstruation, since then the risks are less, and we have time for resort at once to an operative procedure before the advent of the next period.

As contra-indications to the use of any tent may be mentioned acute inflammatory affections of the uterus or of its surroundings, collections of blood around the organ or within it (hæmatocele, hæmatometra), and, of course, pregnancy. In the hands of a skilled observer, as Schultze has also pointed out, the use of the tent in cases of so-called chronic metritis and endometritis often leads to good results as regards cure. In instances where, notwithstanding the existence of great tenderness of the uterus or its surroundings, we are forced to resort to dilating measures, it is self-evident that our precautionary and antiseptic measures should be stringently increased.

Although the examination after dilatation may give excellent results, this is still often a very difficult matter, and may lead to an erroneous diagnosis. Generally, as we have stated, it is the region just above the internal os which offers obstacles to examination, but the cavity itself may only be touched with ease when it has been distended by large new-growths, and when the parenchyma has become soft and distensible, else the walls of the uterus lying so close it may be difficult to recognize slight anomalies of the mucous membrane, in particular near the orifices of the tubes. In such cases it is of advantage to use a small sharp curette to remove portions of the mucous membrane for examination. It is self-evident that after the use of a sponge tent we can draw no deductions as to the consistency of the uterus; still, many changes in consistency are of diagnostic value, and Spiegelberg claimed that lack of dilatability pointed to beginning carcinoma. Further, from the use of the sponge tent the surface of the mucous membrane will be so altered that we are liable to error. Long-continued pressure of the tent may have such an effect on excrescences, and even on fibrous structures, polypi, small myomata, that they become softened, thinned out, or entirely destroyed. On this factor Sims formulated a new therapeutical use of the sponge tent. This tent, of course, affects most markedly only that portion of the mucous membrane with which it is in contact, and the portion higher up is scarcely altered.

For the sake of completeness we would simply refer here to Emmet's sponge dilator and to the water dilators.

In our endeavor to make all our manipulations as free from danger and as aseptic as possible, gynecologists have latterly been returning to the mechanical means of dilatation formerly in vogue. With all our care and precautions in the selection of material for tents the secretions may decompose, and even from the slight lesions of the mucous membrane there is risk of absorption. Further still, dilatation by means of tents requires considerable time, and often it is not possible to expend this on account of the reaction of the uterus against protracted irritation.

The rapid dilatation in favor to-day has its outcome from Schatz's metranoicter. Two intra-uterine stems connected together by a metal crescent, are inserted closed into the uterus by means of a forceps constructed for this purpose. When the forceps is removed the stems separate and dilate the cervix according to the tensile strength they possess. Thicker stems are inserted until complete dilatation is obtained. By means of the metranoicter we may certainly work aseptically, since we

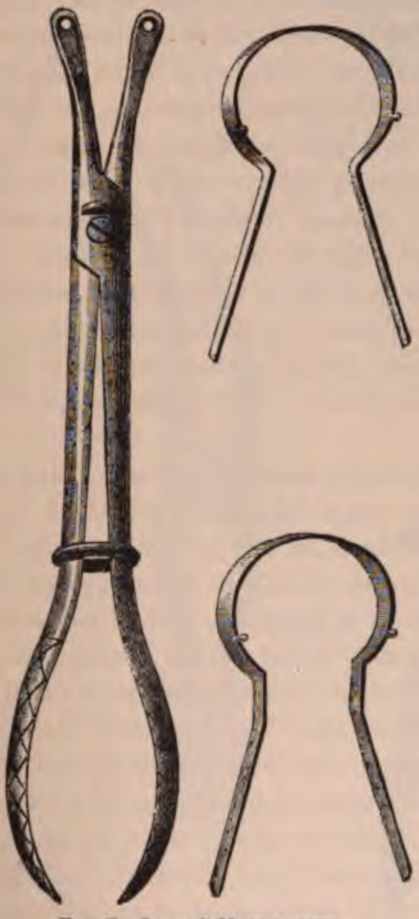


FIG. 47.—SCHATZ'S METRANOICTER.

may irrigate while the instrument is *in situ*, but the instrument is not likely to become popular since it causes great pain, and, further, is too complicated, dear, and difficult to cleanse.

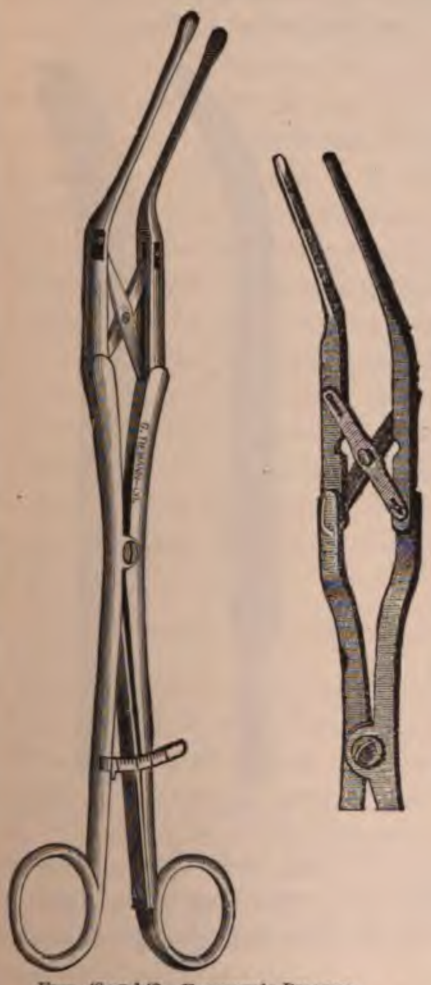
For the purpose of rapid forcible dilatation of the cervix, instruments have been devised by Osiander, Carus, Aveling, Busch, Mende, Leblanc, Hunter, Nott, Atlee, Priestley, Ellinger, Miller, Wilson, Schultze, Ball, and others. Of this number I will describe only a few.

The Ellinger dilator, where the blades separate parallel one to another, is only useful in instances where we aim simply at slight dilatation, seeing that the blades are slender; for cases, hence, where we wish to dilate before inserting an intra-uterine stem, or before making applications, etc. The advantage resulting from the parallel separation of the blades is lost by the fact that the blades feather. The great objection to the instrument, however, is its complexity, which renders it difficult to cleanse except by heat. To remedy this objection I have modified the instrument somewhat, by making the cross-bars as well as the lock separable, whereby I am able to take it entirely apart in order to cleanse it. (Fig. 49.)

A second instrument, incomparably stouter, and more especially useful for purposes of rapid diagnostic dilatation, is that of Schultze. By means of this instrument, as also by another devised by Schultze which works transversely, we are able to obtain a great degree of dilatation, although not without in general superficial lesions of the mucous membrane. As preparatory to this forcible dilatation we may resort to tents, once or twice, and use hot injections, measures which considerably soften the tissues. We may often begin to dilate with Ellinger's instrument and then complete the act with Schultze's, and in a very short time obtain sufficient dilatation for the application of therapeutic measures.

[Of instruments more at the disposal of the American practitioner we would mention the Palmer dilator and the Goodell-Ellinger. The Palmer dilator will dilate to an outside width of one and a quarter inches, which is sufficient for ordinary purposes of exploration. We have had a smaller Palmer constructed which will answer very well for slight dilatation in office practice and also as preparatory to the larger size. The blades of the Palmer will not feather, and we are thus assured of equable dilatation, and further the screw, by means of which the blades are separated, is a decided advantage, in that we may dilate slowly without tiring the

ds. The Goodell modification of the Ellinger dilator (two sizes) is
an excellent instrument, somewhat stouter and bulkier than the
ner, and dilating to an outside width of one and one-half inches.
as the advantage with the Palmer over the Sims (or the modified



FIGS. 48 and 49.—ELLINGER'S DILATOR.

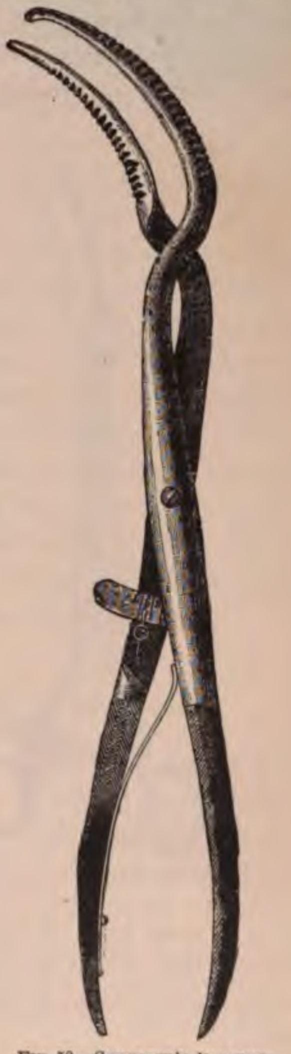


FIG. 50.—SCHULTZE'S DILATOR.

ie-Sims) of possessing a screw attachment for the separation of the
es, whereby the process may be gradual, by slowly causing the mus-
r fibres of the cervix to yield to the applied pressure, rather than
ible.—ED.]

Slower dilatation by means of bougies, sounds, etc., will generally suffice for the treatment of stenosis of the cervical canal. We may, however, through the use of instruments of greater calibre obtain sufficient dilatation in a short time to allow of examination of the uterine cavity with the finger, and this method is the one which I resort to almos entirely, often combined with brief use of a tent. The simplest and mos easily cleansed instruments are the hard rubber dilators of Hegar, whic

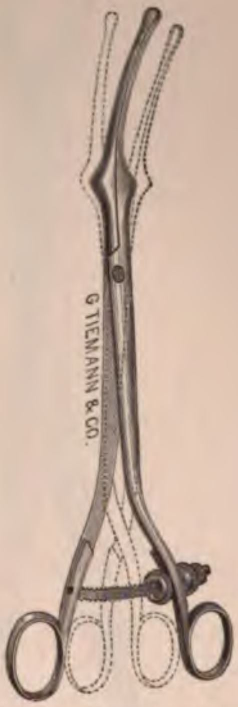


FIG. 51.—PALMER DILATOR.

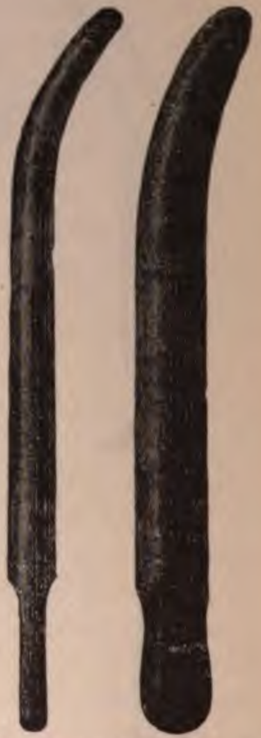


FIG. 52.—HEGAR'S HARD-RUBBER DILATORS.

come in sizes from .07 inches to one inch in diameter. On account the ease with which the smaller sizes break, I use at the outset lead copper sounds from .07 to .3 of an inch, and then resort to the har rubber.

The dilator is dipped into a 5 per cent. carbolic or a .05 solution o sublimate before use, and the vagina is carefully disinfected, as also when possible, the uterine cavity, which, in case of very narrow os, ca only be done after the use of one or two numbers. The uterus is steadie with a tenaculum and drawn downward, and then with the patient in the dorsal or the lateral position, and through a short univalve speculum, one after another of the dilators are inserted. Anesthesia is certainly of assistance, and is only exceptionally not to be used, seeing that the ultimate examination will be painful, and the patients are in a nervous and an irritable state after the dilating measures. Under the irrigation the dilators are inserted until the finger can be readily introduced. In general, an instrument three-quarters of an inch in diameter will suffice, and the operation, which should be done slowly, lasts from a half to three-quarters of an hour. In case we are dealing with rigid tissues, as in a nullipara with long cervix, then it is well to insert as a preparatory measure one to two tents, which will cause such softening of the muscular fibres as will render the examination far easier. The use of a tent after dilatation I cannot consider advisable, in the first place, because there are present lesions of the mucous membrane, and secondly because it is discouraging to the patient to supplement one operation by another.

After dilatation and examination, the genital canal is again cleansed, and when no therapeutical measure has been resorted to, an iodoform pencil is inserted into the uterus and the patient put to bed for a day or two. At the expiration of this period the canal has again closed, although for some time it remains more patent than it was originally.

II. The Surgical (bloody) Dilatation of the Cervix.

The bloody dilatation of the lower uterine segment consists in the longitudinal opening of the cervix by means of cutting instruments. This operation, formerly, although incorrectly, called hysterotomy, is to-day known under the various names of discission of the cervix, hysterostomatomy or trachelotomy (Peaslee), stomato-plastice (Küster). According as the lateral walls or the anterior or the posterior wall of the cervix is incised, we speak of lateral or sagittal discission, and according as the incision extends above the internal os or only includes the vaginal portion of the cervix, we speak of internal or external discission. The lateral and sagittal discission may include both lips or one alone, bilateral, unilateral discission. These types of the operation have been much modified, in particular by Fritsch, Kehrer, Küster, Marckwald, Schröder and others.

Discission of the cervix is indicated as well from a diagnostic as from a therapeutic standpoint, and generally from the latter. It is seldom resorted to in connection with other dilating measures, or to make more space for the insertion of anything through the cervical canal, and less frequently still, in order to allow of digital examination.

This operation was discussed in the last century from an obstetrical standpoint, as a measure for expediting the first stage of labor, but was only introduced into gynecological practice about 1850. In 1843 both Simpson and Jobert resorted independently to discission, and before 1850 it was performed by Kennedy, Minckwitz, Margerie, Barett, Oldham, Malgaigne, Martin and others, but its general acceptance dates from the appearance of Sims's work on uterine surgery, notwithstanding the opposition of Tilt, Duncan, Scanzoni and others, who claimed that the method was far more dangerous than other dilating measures The remarks in the above work in regard to the value of discission in the treatment of sterility and the results obtainable, have led to a wide dissemination of mechanical views, so that many gynecologists consider discission the necessary indication for the relief of sterility, and in this respect the book has been of harmful influence on the non-critical reader. Notwithstanding, the publication of this work marks an era in gynecology, since in it are the first attempts to treat the diseases of the uterus on strict surgical principles, and such principles have from this time forth greatly influenced the course of gynecology.

In case we aim purely at opening up the cervix, then this organ may be incised at the point of narrowing, either through the speculum, or under the guidance of the finger. The deeper and the more numerous the incisions, the wider the cervical canal becomes, and we should guard against injury to the parametrium, the peritoneum and the vagina. In case we only wish to open up the external os, then any straight or curved scissors will suffice. This measure is resorted to when we desire to gain space for the removal of a myoma or an intra-uterine polyp. We cut, then, at that point where the finger detects tension, after having determined by means of two fingers in the vagina or one in the rectum, and one in the vagina, the thickness of the segment.

In all other instances the manner of operating will depend on the method selected. As typical of the operation, we may describe bilateral discission of the cervix, where both orifices are incised. With slight modifications this operation may be applied to the external, the sagittal, and the radiating discission.

Originally Simpson used his well-known, single-bladed hysterotome, with which, under the guidance of the finger, he incised one side of the cervix and then the other, as he withdrew the instrument, the incision extending from above the internal os through the entire length of the organ. This instrument had the disadvantage of having to be used twice, and that the second incision was likely to be less deep than the first, since as the result of the first incision, the tissues were no longer on the stretch.

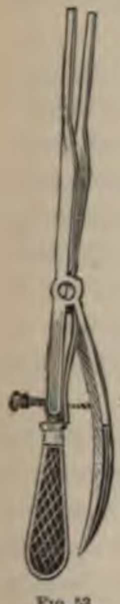


FIG. 53.
SIMPSON'S
HYSTEROTOME.

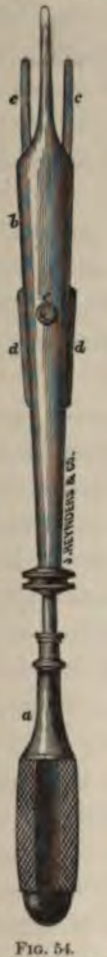
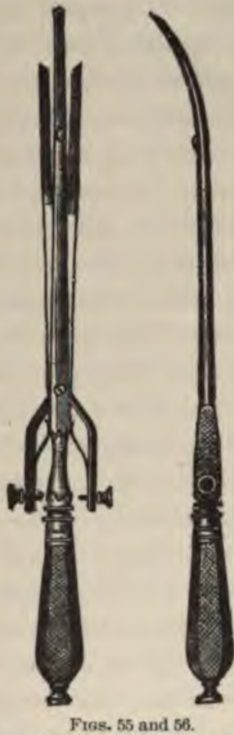


FIG. 54.
GREENHALGH'S
HYSTEROTOME.



FIGS. 55 and 56.
MARTIN'S HYSTEROTOME.

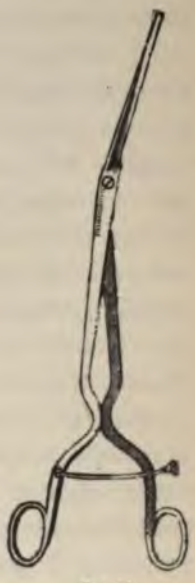


FIG. 57.
STOHLMAN'S
HYSTEROTOME.

Greenhalgh, Martin, Coghlan, Hüter, Stohlmann, Coghill, Kehrer, White and others, then constructed two-bladed instruments, of which number the Greenhalgh-Gusserow is generally used. This instrument consists of two Simpson's metrotomes. It carries two slender blades which are sunk in a groove, from which they emerge as the instrument is withdrawn. In Martin's instrument the entire mechanism is exposed to view, and it is slightly curved on the flat. Stohlmann's metrotome is simpler, and Kehrer modelled his instrument after it. It consists, as does Coghill's, of a long, slender pair of scissors cutting outwards, and controlled by a screw in the handle.

For these complicated instruments Sims substituted the scissors and the knife. He incised the lateral walls of the cervix with the scissors up to the vaginal insertion, and extended the incision by the knife above the internal os. Küchenmeister's modification differs purely in the fact that the incisions are made from without inwards.

If we except discission by means of Simpson's hysterotomes, there are numerous objections to the other instruments, the chief of which is the fact that they are all very difficult to keep clean, in particular Greenhalgh's. Discission by means of the knife and the scissors requires more skill, assistants, and time. The operation, however, is almost painless; the operator has full control of the procedure, and may make his incision as deep as he pleases, and in any direction he wishes. Only in case of the highest degrees of narrowing of the cervix may it be impossible to pass the knife by the internal os, and then one of the slender knives of Peaslee, White, or Galabin may be used.

Aside from resort to discission to enable us in exceptional instances to insert a tent, and aside from it as a substitute for tents, stenosis or similar changes in the cervix at the external or the internal os are the most frequent indications for the operation. The most common site of narrowing is the external os. The changes at the internal are usually due to flexion or congestive phenomena in the mucous membrane, swelling cicatrices, etc Narrowing of high degree, such as where a sound .07 of an inch thick will not pass, is very exceptional. As to the slighter degrees of narrowing opinions vary greatly. Martin insists that the extremity of the ordinary uterine sound should pass; Peaslee gives us a precise scale of narrowing, and considers incision of the internal os indicated when a sound one-eighth in diameter will not pass, and of the external os at one-sixth inch and below. In about 400 discissions, I have been guided rather by the presence of catarrh, frequently in conjunction with sterility and dysmenorrhea. We often indeed see, in case of very narrow os, no symptoms of stenosis, sterility, dysmenorrhea, or retention of secretion, while, on the contrary, the latter is the case where the os is very large. It is apparent then that the indication for discission may be present even in case of large external os, because of the existence of a uterine or a cervical catarrh.

Stenosis itself far less frequently attracts attention than the functional disturbances caused by it, as, for instance, dysmenorrhea and sterility. Although it is irrational, in the presence of a subjective symptom and in the absence of anatomical cause, to seek for the indication of an operation, and even though it cannot be held as true that dysmenorrhœic women are very frequently sterile, still to-day it is not contrary to sound practice to perform discission in case of sterility and of dysmenorrhea even though no marked stenosis be present. The evidence that women who have borne children more readily conceive than those who have not leads us to the belief that it is right to resort to discission in case of sterility, even though an examination shows no abnormality in the genital system. Seeing that the operation at the external os is almost entirely without risk, the indication is a just one, but as regards the internal os, the most frequent site of stenosis, it is not. Sufficient statistical data in regard to this point have not been given us. The 483 discissions practised by Haartmann, G. Braun, Martin, Kehrer, and myself, up to 1878 were followed by good results in 148 (30.7 per cent.). These observations, however, are not precise enough in regard to whether the discission was performed for sterility alone, or partially on account of some abnormality. The opponents of discission oppose to it the extremely small size and the power of motion of the sperm cells, and further, the many recorded cases of conception in cases of exquisitely marked stenosis, flexion, unruptured hymen, and the like. Although we are far from warranted in the belief that the chief cause of sterility resides in abnormality of the vaginal portion of the cervix, yet it must be granted that the chances of the spermatozoa entering the uterus are greater where the orifices of the organ are larger. It must further be noted that certain states of the orifices are unfavorable for conception. Olshausen, Martin, and I, have noticed this fact in connection with rigid os, and it seems as though the opening power of the os were of greater importance than its absolute width, and the same is apparent from the researches of Hoffmann and Basch in animals.

The same remarks are applicable to dysmenorrhea. Holst's researches on the cadaver are not of much importance. In regard to menstruation we are not concerned alone with the quantity of the blood, but also with the rapidity and the nature of the outflow. Further still, at the menstrual period the congestion of the uterine tissue and mucous membrane lead to narrowing of a previously wide orifice.

Not infrequently the results from discission in case of dysmenorrhea and sterility are to be laid to other causes than the mere widening, as, for instance, the loss of blood at the time, the relaxation of the tissues, the necessary applications of astringents and of caustics in the after-treatment. Frequently the stenosis is associated with a long cervix and induration of its tissue; only in the lesser degrees of elongation is hysterostomotomy of utility, in the higher degrees amputation being essential. Induration of the tissues calls especially for discission, seeing that all other measures with dilatation in view are uncertain, and of long duration.

Flexions and versions are frequent indications for discission. In the first instance, aside from the not uncommonly present stenosis, the aim is to make the uterine canal straight. With this end in view we resort to sagittal discission of the anterior lip in case of retroflexion, of the posterior lip in case of anteflexion, and to lateral discission in case of lateral flexions, and in instances of dysmenorrhea, in particular, we thus often obtain brilliant results, although in marked cases simple discission is of no avail. We do not effect any special alteration in the uterus, but we see a beneficial result on the flexion by the production of a free outlet for the secretion. To incise the uterine wall at the flexion site, the anterior in case of anteflexion, and the posterior in case of retroflexion, certainly assists in straightening the uterus, but this is a very dangerous procedure, owing to the thinning out and generally atrophic condition of the wall of the uterus at this site, and is therefore not to be recommended.

Versions very frequently call for discission, on account of the stenosis the result of the accompanying metritis, and, further, because they directly interfere with the entrance of the spermatozoa owing to the fact that in anteversion the anterior lip of the cervix cuts off the lumen of the vagina, and in retroversion the os lies against the anterior vaginal wall and is hence inaccessible to the spermatozoa which are deposited in the posterior fornix. In the first instance the sagittal discission of the anterior lip, or better still the removal of a wedge-shaped portion, assists matters, and in the second instance the sagittal discission of the posterior lip. In case of lateroversion we perform discission on the lateral wall of the same side as the version, in order to make the os patent towards the receptaculum seminis. In my experience it has been simply a coincidence when in these instances the lateral and sagittal discission has given better results than the bilateral.

A further indication for discission is hemorrhage in case of fibroids of the uterus.

Baker Brown, Tilt, McClintock, Nèlaton, Spiegelberg, Matthews Duncan, West, G. Braun, and others, perform the operation with more or less good results. The explanation offered for the manner of action is not sufficient. While Baker Brown claims that by section of the sphincter muscle at the internal os the chance is given the uterine muscle to lie close against the tumor—a species of self-tamponade—Spiegelberg sought the effect in the relaxation and retraction of the mucous membrane, and the shrinkage in the blood-vessels. To-day experience teaches us that the operation is in these instances uncertain and gives no lasting result, and that the chances of relief are far greater from cutting the capsule of the fibroma.

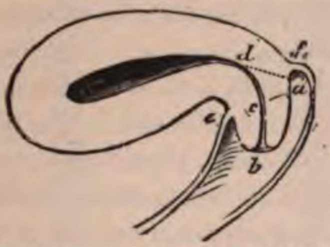


FIG. 58.—SAGITTAL DISCISSION IN CASE OF ANTEFLEXION. (After *Sims.*)

Finally, as an indication for discission of the cervix we have the necessity of thorough dilatation of the uterine cavity. Schröder first incised sufficiently to allow of the easy insertion of the finger into the uterine cavity, in view of the length of time required by tents and the more or less danger consecutive to their use.

There has been much discussion as to whether dilatation by tents or steel dilators was not preferable to discission. Dilating measures, however, which require a long time, are always accompanied by much traumatism, and are more likely to be followed by septic absorption, and, further, generally give no lasting results, almost uniformly so when the stenosis affects the external os and the tissues are indurated.

It is not possible from a comparison of the risks following on bloodless dilatation and on discission to draw a conclusion in favor of the one or the other, and since the introduction of antiseptics discission has become practically an operation free from risk, although if we neglect antiseptic rules we may meet with very bad results. I have heard during the past few years of cases of death from sepsis after the use of a complicated and a possibly unclean uterotome, and I have myself had a fatal result after discission notwithstanding the use of stringent antiseptic precautions. Still, the risks from discission are much magnified by the opponents of the operation. Even in pre-antiseptic times but few unfortunate results could be collected, and from the statistics of Beigel, Tanner and Ballard, Sims, Emmet, Greenhalgh, Hegar and Kaltenbach, Martin, C. Braun, G. Braun, Kehrer, and myself, it turns out that in more than 2000 operations there were only four deaths, and in twenty-two instances hemorrhage or inflammatory affections, the outcome of which was cure.

Altogether we are in a position to affirm that discission of the external os, performed with the proper precautions, may be ranked among the least dangerous operations, while that of the internal os is not to be ranked in the same category. As far as the external os is concerned discission is a more certain means of cure than dilatation. As for the internal os the results from discission are not much better than after dilatation. There are many stenoses, above all those due to thickening, swelling of the mucous membrane, which are best treated by tents or in some other way, as by the curette; and further, in case of congenital stenosis with insufficient development of the uterus and absence of menstruation, the tents act also as emmenagogues.

There are but few absolute contra-indications to discission, but seeing that the operation is performed for the relief of something which is not dangerous to life, these contra-indications must be religiously borne in mind. All recent and chronic inflammatory processes in the uterus, its adnexa, the pelvic peritoneum and pelvic cellular tissue; great lack of development or atrophy of the uterus owing to the risk of injury to the parametrium; pregnancy, or the puerperal state; the presence of tumors or ulcers in the uterus or its surroundings, the secretion from which might infect the incision; the immediate use of a sponge tent; the presence of menstruation or its near approach—such are the factors to be guarded against. In the two cases of severe parametritis which I observed, the discission was performed a few days before the onset of the menses.

For the performance of bilateral discission, which may be taken as the type, we need at least one assistant, a duck-bill speculum, a depressor, a tenaculum or tenaculum forceps, a long-handled knife, an instrument for tamponing, and tampons. Anesthesia is seldom requisite, since the operation is rarely painful.

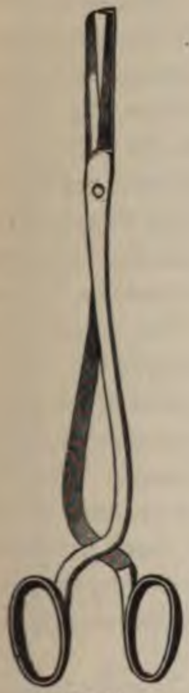
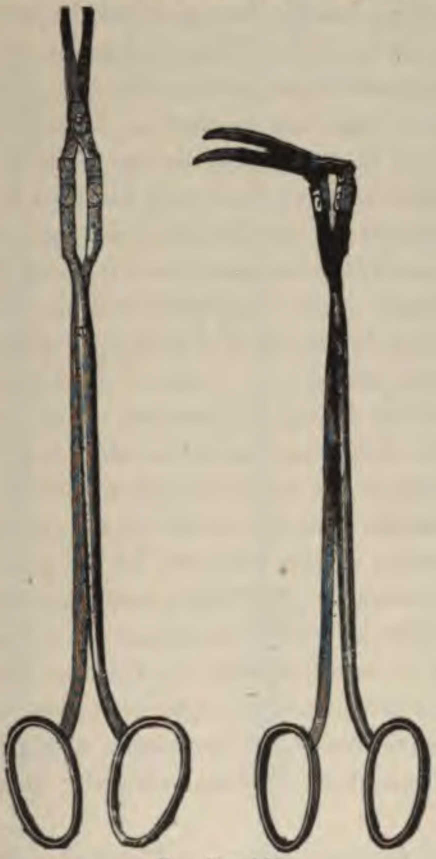


FIG. 59.
KUCHENMEISTER'S SCISSORS.



FIGS. 60 and 61.
HEYWOOD SMITH'S SCISSORS. (*Beigel.*)

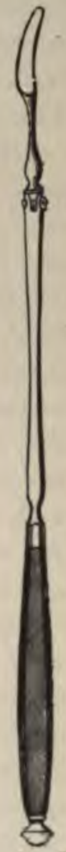


FIG. 62.
SIMS' KNIFE.

The patient is placed in the left lateral or in the elevated dorsal position, and the cervix is exposed in the usual way. A tenaculum is inserted into the anterior lip of the cervix and the uterus is drawn slightly downwards. With the sound we again examine the cervix in regard to the degree of stenosis, and we cleanse carefully the field of operation by means of cotton dipped in a 5 per cent. solution of carbolic. Whenever the size of the cervical canal will permit, the uterine cavity is to be washed out, or if this is not possible I at least cleanse it with the cotton applicator and then insert an iodoform pencil. While an assistant holds the speculum, the tenaculum forceps is held in one hand, and one blade of Sims's scissors, which are curved on the flat, is inserted into the cervix until the vaginal blade has reached the bottom of the vaginal fornix. The operator, of course, should be ambidextrous. The walls of the cervix are thus incised, first to one side and then to the other, below and above, if the patient is in the left lateral position. To make the incisions properly the blades of the scissors should be about 1½ inches long, strong, and not feathering. Since during the cutting process the blades slip a trifle and we thus do not cut through all the tissue, Kuchenmeister has had a small hook affixed to one blade. A good scissors, because it can be bent at an angle, is Heywood Smith's. In case we desire to incise the internal os, the knife is inserted a trifle above it and cuts down, if possible in one stroke, to the end of the scissor incision. The incision with the knife is likewise made first to the left and then to the right.

The knife alone answers quite well for the performance of the operation. I always use a simple, straight, small-bladed knife, which may pass even where there is marked stenosis of the cervical canal. (Fig. 63). We must only be careful to make the incisions exactly opposite, so that the anterior and the posterior lip may be opposite one another. In case we use, as does G. Braun, the lance-knife of Kuchenmeister, then it is passed deeply enough for the blunt extremity to be forced through the internal os.

In a similar way the unilateral and sagittal discissions are performed. In case of the sagittal discission we must be careful not to insert the tenaculum in the centre of the os, else it will be in the way of the incision.

After the completion of the incisions the field of operation is carefully cleansed, and we assure ourselves by means of the finger or the sound of the completeness of the discission. We next proceed to check the hemorrhage. Sims was in the habit of tamponing the cervical canal with cotton dipped in chloride of iron; Simpson passed a brush wet in liquor tin passed a waxed sponge tent; Kehrer places an iron tampon na and only injects the styptic fluid into the cervix in case of e; C. Braun gives a vaginal douche of a solution of sesqui- iron; Olshausen recommends the immediate cauterization of

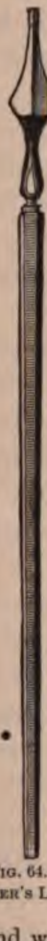


Fig. 64.
Kuchenmeister's Lance-Knife.

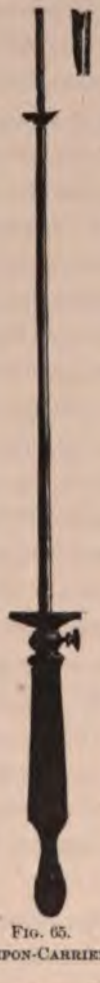


Fig. 65.
Tampon-Carrier.

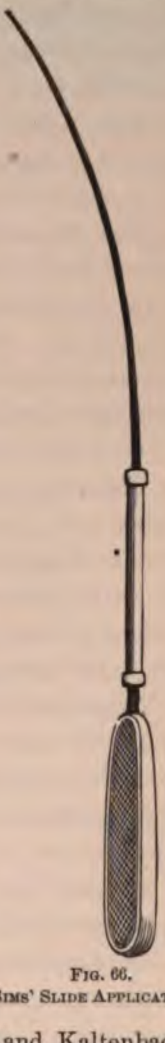


Fig. 66.
Sims' Slide Applicator.

of the wound with the actual cautery; Hegar and Kaltenbach, nzoni, wash off the cervix with chlorine water, and depend on injections for checking the hemorrhage.

ver possible I dispense with the use of astringents, as also of f iron. In general the careful tamponade with iodoform gauze, or, better still, with iodoform-tannin gauze, suffices. In case of greater loss of blood, styptic cotton should be used. I use for this purpose cotton dipped in a neutral solution of liquor ferri, thoroughly dried before use, and inserted by means of a tampon-carrier (Fig. 65). This consists of a cylindrical silver blade, slightly flattened anteriorly, the upper end of which is forked. This blade carries a slide. The blade is armed with the cotton, is inserted into the cervical canal, and there slipped off by the slide. Below this cervical tampon, I apply two to three layers of iodoform gauze, which is preferable to glycerine or carbolic tampons in that it may remain *in situ* for a number of days.

[The Sims slide applicator answers a similar purpose. The string attached to the cervical tampon should be of a different color from that of the vaginal tampons, so that in removal the former may be readily extracted last. Ordinarily this cervical tampon dipped in the compound tincture of iodine will amply check the existing oozing and guard against the danger of secondary hemorrhage.—ED.].

While hemorrhage is being checked, special care should be taken that the tenaculum do not slip, since it would otherwise be quite a difficult matter to fix the anterior lip again amidst the discharge of blood. If after the thorough tamponade there is still bloody oozing, the cotton must at once be removed and a fresh supply inserted. The hemorrhage is rarely so profuse that we are obliged to resort to more energetic measures, such as the cautery or the suture.

The patient is then to be carried to her bed—on no account should she be allowed to walk—and for twenty-four hours absolute quietude should be enforced. It is exceptional that the rectum or the bladder require artificial aid. In case the iodoform tampon has been used, it may be left for two to three days, unless there be profuse secretion, fever, etc. On the removal of the tampon the vagina should be gently douched with a luke-warm solution.

The risk now is of the occurrence of secondary stenosis from union of the wound edges. To forestall this we may insert cacao butter suppositories, stems of hard rubber or of glass; some prefer the sound or the metal dilator. We believe that all these procedures should be desisted from, and that it is better to risk the necessity of a second discission, than by irritation of the wound to cause a possible metritis or parametritis.

Among the risks from discission, we may mention: 1. Injury to the neighboring organs, the parametrium, peritoneum, the ureters, all of which may be prevented by taking the precaution not to cut too deeply. 2. Hemorrhage, which is often very profuse, in particular after the sagittal discission. The use of iron will almost always check this, if we are careful during the operation to cause a reliable assistant to steady the cervix. Secondary hemorrhage will, in general, only occur when the tampons become displaced through restlessness of the patient, or great abdominal effort. 3. Inflammations of the uterus, parametrium, and peritoneum, processes which it is evident from what has gone before are very exceptional. Affections of this nature generally result from uncleanliness, the after-use of a sponge tent, irritation of the cut surfaces from, for instance, the insertion of the finger, of the sound, stems, vaginal injections, resort to divulsion after incision. A predisposition to such inflammatory processes exists in the presence of old adhesions, oöphoritis, salpingitis, or near the menstrual period. 4. Abnormal adhesion of the newly-formed os, or of the cervix. If after discission the wounded surfaces are left to themselves, then the edges fall together and after union there remains only a linear cicatrix. But where after discission an iron plug is inserted, the edges tend to spread out, and the after-contraction leads to considerable narrowness of the os, more so, indeed, than existed previous to the operation. For this reason it may become necessary to repeat the discission. Further still, when the incisions are not exactly opposed, on union one cervical lip may be larger than the other, and the external os has a crescentic shape which may be covered over by a little valve-like projection from a cervical lip. In case, again, we incise the internal os too deeply, then, as Sims has pointed out, the longitudinal muscular fibres are stronger than the circular and the lips roll outward with a resulting ectropium.

In all cases where thick cervical lips lie close together, as in most instances of anteversion, it is desirable instead of the sagittal discission to remove a wedge-shaped piece from the cervix. The same procedure is applicable to cases where there exists a crescentic os and a short vaginal portion of the cervix. The apex of the removed wedge points upward, and thus the patency of the os is secured.

Even the most careful after-treatment will not secure as wide an external os as it was immediately after discission, seeing that contraction to a degree infallibly occurs.

The description of the operation which we have given applies to simple discission as we were originally taught it by Sims. Attempts at the prevention of cicatricial contraction; at making union certain by covering over the surfaces with mucous membrane; the knowledge that together with the operation diseased portions of the cervix could be removed, all of these factors have led to a number of modifications in the operative technique. For the sake of completeness we will refer here to the most useful of these modifications, the majority of them being treated of at length under the description of disease varieties.

Gusserow first incised the os cross-wise, a procedure which Kehrer extended by making six to eight radiating incisions. There remains after these a widely open star-like os, which, after cicatrization, is still relatively large, with a number of depressions at its borders. The procedure is self-descriptive, only the hemorrhage must be even more carefully checked than in case of the bilateral discission. This method of discission cannot, however, be entirely endorsed, for with the number of incisions the size of the wound is increased, and therefore there is additional risk of hemorrhage and absorption. Furthermore, we often obtain very mishapen orifices, for it is not possible to guard against union of one or another of the incisions.

A more certain way of keeping the os open is by following Fritsch's method, which consists in making the crucial incisions and then trimming off the edges of each little flap. It is not necessary to incise to the depth of the vaginal vault, but incisions to about .39 of an inch suffice, and then the removal of the inner half of each flap. This operation is exceedingly simple, and Fritsch performs it in his office. After the crucial incision with the knife the flaps are lifted up on a tenaculum, and with scissors or knife the edges are cut off to as to leave a funnel-shaped opening The slight hemorrhage may be checked by an iodoform or a tannin-iodoform plug. Formerly, before I began to use iodoform, I was in the habit of cutting through the cervix with an elastic ligature. With a sharply curved needle I passed the ligature through the cervix towards the vagina and then clamped the ligature with shot.

Far safer and surer in its results is the plastic covering of the wounded surfaces, and it guards most certainly against infection and later malformation of the os. Following Roser in his phimosis operation, after discission of the cervix and the vaginal mucous membrane, I have turned in each flap, so that the apex lay inwards and the base upwards, and sewed it into the angle of the wound. The passage of the sutures is very difficult, but the result has been very good. To cover the edges of the incision I have brought together the external mucous membrane and that of the cervix. Küster performs a similar operation (stomatoplastice uterina interna) which has been followed by good results. Also in case of cicatricial contraction of the internal os, resisting all other methods of treatment, he has performed bilateral discission, excised the cicatricial tissue and turned in the vaginal mucous membrane, thus securing cure. For these difficult operations a special needle-holder is requisite, one having various curves, and Küster has specially devised one.

The patency of the os is best secured, however, by the conical (Kegelmantelförmig) excision of M. Marckwald. The operation belongs properly under the consideration of infra-vaginal amputation of the cervix, but when so performed as not to lessen the length of the vaginal portion of the cervix it may be considered as a species of discission, and will here be briefly described.

The bilateral incision of the cervix is first performed with the patient in the dorsal or in the left lateral position. Then the anterior portion of the cervix is seized by a tenaculum forceps, and a slender sharp-pointed knife is inserted near the border of the cervical mucous membrane and about parallel with it to the depth of about .39 of an inch, and an incision is made with it to the same depth from one side to the other. The knife is again inserted nearer the external border of the cervix, about .18 to .39 of an inch from the former incision, deep enough to reach its internal border, and by an oblique incision a piece is removed from the cervix which has the appearance of a segment of a cone. In addition then to the two large flaps resulting from the bilateral discission we have two smaller ones, an internal which is covered with cervical mucous membrane, and an external, thicker, which is the outer wall of the cervix. Then, if the uterus is drawn down, with a straight needle-holder, and if *in situ*, with a curved, three to five sutures are passed through both flaps to the bottom of the incision and these are tied with accurate adaptation of the mucous membrane. Similar steps are then followed on the posterior lip; there remain small openings at the lateral incisions which are closed by a few sutures. The sutures are cut short, the vagina is cleansed and packed with iodoform.

By the excision of segments of varying thicknesses and depths, according as the knife is held more or less obliquely, or is inserted near or at a distance from the edges of the cervix, we obtain a more or less patulous os.

After the lapse of five to seven days, if we have operated antiseptically and placed our sutures carefully, we obtain union by first intention, and we may remove our silk or silver sutures. This operation, granted the necessary dexterity on the part of the operator, leads to the best results and with the least risks. Of 350 operations of the kind Schröder has not had a death, and neither Marckwald, Küster, nor I have had any complication. In performing the operation we must be careful not to make the first transverse incision too near the mucous membrane, or else it may readily be perforated, and we must further take care lest in passing the sutures we cause rolling upwards of the cervical mucous membrane. The operation is most likely to be interfered with by hemorrhage, the result of careless suture. In case the uterus is movable and the vagina is wide the operation may be readily and easily performed, but it is difficult in case of adherent uterus or narrow non-distensible vagina. In the latter instances the passage of the sutures is in particular troublesome, especially at the sides, and we need a curved needle-holder or even needles on a handle

The operations which we have so far described aim at enlarging the cervical canal although not to such an extent as to be passable for the finger. Deep incision of the cervix, as performed in particular by Schröder, and which he prefers above all other dilating measures, is the diagnostic discission *par excellence*. The method is, however, as Martin points out, not free from danger, in the hands particularly of inexperienced operators, and therefore it has not become popularized except in the practice of pronounced specialists. We are able to-day by means of other measures—as for instance, the curette—to dispense, in general, with digital exploration, although there are still cases where it is necessary to pass the finger and in addition instruments through the cervical canal in order to recognize and remove intra-uterine polypi, myomata, sarcomata, remnants of placenta, etc.

Schröder's operation should be performed under recognized antiseptic rules, with the patient in the dorsal position and anesthetized. When necessary, ligature of the uterine arteries must constitute the first step. The uterus is drawn well downward by a tenaculum forceps and well to one side, we then usually feel the arterial pulsation to one side, but if we do not we insert our needle close to the reflexion of the vagina from the cervix; we should use a strong, not very long, sharply curved needle and pass it around the artery from in front backwards. The more tissue we include the stronger must be the ligature. The process is to be repeated on the opposite side. We next incise the cervix with knife and scissors, or, better, with the former alone, from the internal os outwards. The incisions are deepened until the finger can be passed. After the examination, or the operation has been concluded, the two portions of the cervix are to be re-united. The sutures are passed so that the first lies at the internal os, its point of exit and of entrance being in the vaginal fornix. The remaining sutures are more readily passed, only we must be careful to remain on the border of the cervical mucous membrane to forestall after-stenosis. The sutures of one side are inserted as far as the external os, and then the other side is similarly treated. If the sutures have been carefully passed there is no bleeding, but otherwise superficial sutures will be needed. The after-treatment is similar to that after the other operations. Union is ordinarily *per primam*. There is greater risk, however, of wound infection and of hemorrhage than after other methods of operating.

CHAPTER XIII.

ARTIFICIAL DISLOCATION OF THE UTERUS, AND THE DIAGNOSTIC EXCISION.

FOR operative purposes Jobert, Lisfranc, G. Simon, and others drew the uterus downwards by means of a tenaculum, or a tenaculum forceps, and even partially pulled it out of the vagina. This procedure is known as the artificial prolapse of the uterus.

To effect this prolapse, a double or multiple tenaculum is fastened into the vaginal portion of the cervix, and strong downward traction is exerted in the axis of the pelvis. Strong sutures passed through the cervix were substituted for the tenacula in order to gain space. Only the uterus with relaxed ligaments allows such forcible dislocation without danger. Usually the utero-sacral ligaments, to a less degree the broad and the round ligaments, resist energetically this traction, and also, as Savage has shown, the cellular tissue below the peritoneum and around the uterine vessels. Very exaggerated traction may lead to rupture of the peritoneum and to severe traumatic affections, particularly in those cases where, as the result of antecedent inflammatory processes, the structures adjacent to the uterus have lost their elasticity. Schröder has called attention to the risk run, and Mermann has recorded an instance of perforation of the tube in case of salpingitis with fatal result. Artificial prolapse must therefore be regarded as a dangerous procedure, and the process controlled by frequent rectal examination to determine the degree of tension. In case the uterus is readily brought down to the introitus vaginæ and the ligaments are not deprived of their normal elasticity, then no harm is done, and the organ returns to its natural position after relaxation in the traction. Such extreme dislocation as to bring the uterus outside the vagina is rarely requisite. Lesser degrees of prolapse are, however, useful during operations, although we should aim at operating *in situ* as much as possible. Such lesser degrees are also valuable for purposes of diagnosis. Where the uterus is not fixed by disease such change in its position is allowable, although the organ has not such a normal range of movability.

As we stated when speaking of inspection, Sims almost always used a simple tenaculum to bring the cervix into the desired axis, but Hegar and Kaltenbach prefer the tenaculum forceps, and are of the opinion that the procedure has advantages from a diagnostic standpoint, and that it is not dangerous. We may use a simple tenaculum or one or another of the double tenaculums. In order to avoid injury to the cervix the blades of the instrument should be slender and slightly apart. The extremities must be bent at right angles, otherwise it is difficult to remove them. (Fig. 67.)

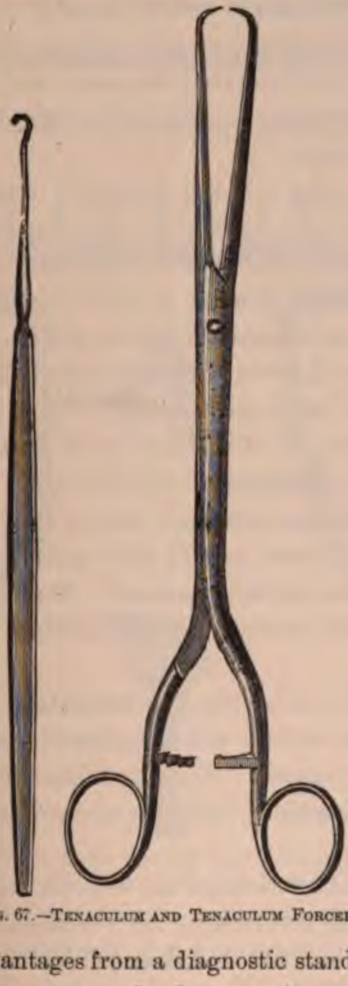


FIG. 67.—TENACULUM AND TENACULUM FORCEPS.

Before resorting to the procedure the vagina and the cervix should be carefully cleansed and disinfected; then either through the speculum or under the guidance of the finger alone, the entire cervix or one or another lip is seized so strongly by the instrument that it will not tear out under gentle traction, and we have the organ perfectly under control. When the uterus is drawn downwards we may examine its surroundings better with the finger in the vagina, we may test the movability of the organ, and we may the better differentiate the nature and attachment of tumors in connection or adjacent to it. Indeed the information obtainable cannot be had in other ways.

It goes without saying that this method of examination may be combined with any of the others of which we have spoken. Thus we may at the same time examine by the bladder, vagina or rectum; we may palpate the abdomen, or cause an assistant to impart motion through it to a supposed tumor. For the examination of the internal surface of the uterus we frequently cannot dispense with the tenaculum forceps, although in case of ductile uterus the organ is drawn out so as to make it difficult for the finger to reach deeply. Excellent results are obtainable from rectal examination during dislocation of the uterus, for the posterior uterine ligaments, the ovaries, and adhesions become more accessible.

Even as with the uterus so may the vaginal walls or tumors of the genital tract be dislocated and examined. We may thus sometimes be able to determine the insertion site of a myoma or polyp and feel the pedicle.

In case peri-uterine adhesions or inflammatory affections are present, we must resort to the method with the greatest care, possibly limit it to simple fixation of the uterus. Acute inflammatory processes are contraindications, as also pregnancy, when the hemorrhage from the cervix may be quite profuse.

When the examination is ended the tenacula are removed with care in order not to injure the cervix or wound the patient. In case the cervix was soft or vascular, or it has been damaged by the tenacula, then it may bleed quite freely. The bleeding points may be touched with lunar caustic, or else, and this is preferable, superficial sutures may be inserted, under the usual antiseptic precautions.

Dislocation of the cervix with the tenaculum is also useful in the reposition of the retro-flexed uterus, and I have for long thus used and demonstrated it with good results. The tenaculum, further, is used during a number of procedures, such as curetting, making applications, the insertion of tents, stems, etc. Still further elastic traction may be exerted for the purpose of rendering the uterus more movable, the adaptation of denuded surfaces, etc.

Originally I resorted to elastic traction in the treatment of parametritic remnants which would not yield to pressure exerted by pessaries, the traction being made in the axis of the pelvis or as nearly as possible at right angles to it. By means of it, also, I have often obtained good results in case of rigid vagina as a preparatory measure to Emmet's operation on the cervix, or for the purpose of rendering possible the coaptation of borders of fistulæ The traction may be slight and long continued; thus from $1\frac{1}{16}$ to 2 pounds weight exerted for one hour or continuously

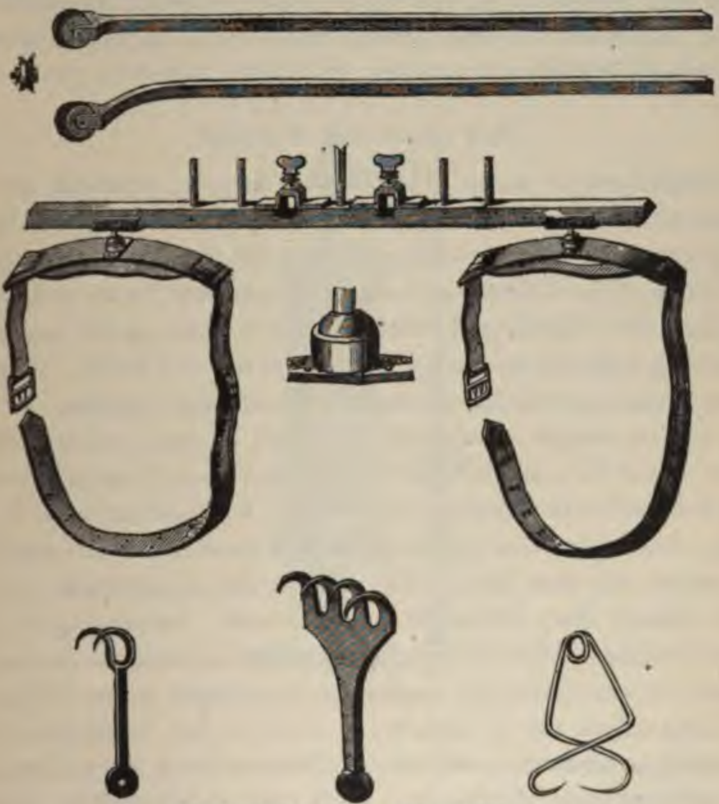


FIG. 68.—APPARATUS FOR ELASTIC TRACTION.

for eight to ten hours, will suffice to overcome quite firm cicatrices, and to render them capable of being stretched.

Instruments of various kinds may be used (Fig. 68). An elastic band is fixed on them, which may be secured to the patient's body, or to an apparatus with a cross-bar. A small dynamometer may be utilized for estimating the traction force employed.

It goes without saying that these procedures should be under antiseptic precautions, and that wounds caused by the hooks should receive the requisite treatment.

THE DIAGNOSTIC EXCISION.

Examination by means of the trocar, harpoon, aspirator, etc., are subject to the same rules in gynecology as are applicable to them in general surgery. We propose to consider here only the diagnostic excision.

In face of the difficulty of recognizing carcinoma in its early stages, Ruge and Veit, Richter and others, have laid stress on the necessity of examining under the microscope portions of removed tissue. Generally we may obtain material for examination with the sharp curette. In order that the microscopic examination may yield accurate results, sufficient tissue should be examined, and the examiner should carefully note the layer from which the portion is removed. It is of essential value in diagnosis to know from what part of the mucous membrane or the muscularis the section has been taken. The excision may be performed with the knife, scissors, sharp curette, or curette forceps. Antiseptic precautions should be taken. After-hemorrhage is treated according to the ordinary manner, by astringents, the tamponade, the cautery, suture or ligature, and frequently it may be necessary to follow up the diagnostic excision by operation, as, for instance, in case of cancer where there is often profuse hemorrhage or traumatism, which may be checked by thorough curetting.

[A valuable means of diagnosis, to which Chrobak makes no special reference, is aspiration. Not infrequently the diagnosis cannot be completed without resort to this means, and reference to it seems essential for the sake of completeness. The instances where, in particular, aspiration will assist us in diagnosis, are small pelvic tumors, the nature of which conjoined manipulation fails in exactly differentiating. Here the point at issue will chiefly lie between hematocele, abscess, small ovarian cyst. In case of larger tumors which occupy in part the abdominal cavity, aspiration, while it unquestionably essentially assists in diagnosis, should, in the opinion of many gynecologists, yield to the exploratory incision, or at any rate should only be resorted to by the examiner when prepared to follow it by laparotomy. This is not the place to discuss the merits and relative advantages of exploratory puncture and exploratory incision; we have in mind rather the description of aspiration for diagnosis, as it will ordinarily be forced upon the general practitioner.

For simple puncture through the abdomen the ordinary hypodermic syringe will suffice to remove sufficient fluid for examination. The procedure cannot be said to carry with it any special risk, provided the syringe, its needle, and the site selected for puncture have been disinfected with care. On withdrawing the needle, the puncture site need simply be covered by a piece of adhesive plaster. For aspiration through the vagina, the hypodermic needle is hardly long enough, and the small aspirator syringe which we figure will be found convenient. The needle of this syringe may be guided along the finger and boldly plunged at the desired point, by preference the most prominent point, and one where there is absence of pulsation, or else the vaginal vault may be exposed

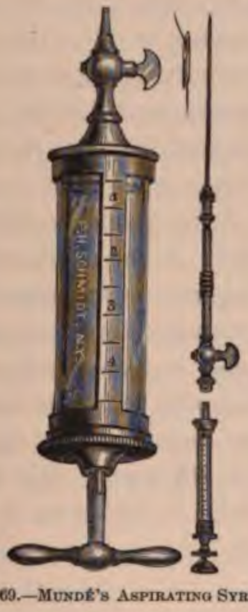


FIG. 69.—MUNDÉ'S ASPIRATING SYRINGE.

through Sims's speculum, and the needle thrust in by sight. The vagina should in either instance be first carefully disinfected, and after aspiration it should be tamponed with iodoform gauze.

As the result of aspiration of abdominal tumors the examiner will obtain a fluid which frequently will have to be subjected to a microscopical and chemical examination before the question of its source can be settled. In general, however, the fluid from an ovarian cyst is straw-colored, or brownish, and contains albumin; that from a cyst of the broad ligament is watery, clear, does not coagulate, containing no albumin; that from hydatid cysts may show under the microscope the hooklets of the parasite; that from ascites is pale straw-colored and coagulates on standing. As is well-known, it is claimed by Drysdale that the detection of the ovarian cell or corpuscle is proof of the presence of an ovarian cyst, but these and other points hardly concern the general practitioner, seeing that it is the custom of the majority to refer instances of abdominal tumor to the specialist. As for vaginal aspiration, in addition to its uses already noted, the insertion of the needle, when instead of a marked tumor there is purely bogginess or indistinct fluctuation, will often, by revealing pus, explain a train of otherwise obscure symptoms.

Such are the main points in reference to aspiration of value to the general practitioner. It should be further stated that diagnostic aspiration should by preference be performed at the patient's house, in order to ensure rest for a time afterwards. For while ordinarily aspiration with the hypodermic needle is innocuous, it has been followed by inflammatory reaction.—ED.]

CHAPTER XIV.

THE FORMATION OF THE DIAGNOSIS.

IT is apparent from the preceding chapters that there are a number of methods of examination, with which it is essential for the physician to be familiar. It has also been made clear to the reader that the results from the different methods of examination are not entitled to the same weight, and are not individually to be considered as absolute. There are grounds for error, aside from the preconceived opinions of the examiner, not alone in the insufficiency of the methods themselves, but as well, and more likely so, in the changes in the genital apparatus, which frequently do not permit the application of correct methods of examination. The proper appreciation of the value of the results from the various methods of examination is something which experience alone can teach, and can only be properly done by minds which are trained to think critically, to judicially weigh results, and which are not inclined to accept blindly as true the authoritative dicta of others. Here the rule should ever be: "Feel for yourself, see for yourself, think for yourself and for yourself alone."

If we possess the requisite skepticism in regard to the results from the physical examination, this spirit is still more necessary in regard to the appreciation of the rational signs. We may so readily be led astray by the recital of the woman's symptoms, such care and discrimination is requisite for the sifting of these symptoms, that it is a most difficult task to reach the truth.

Although these remarks are not purely applicable to gynecology, it is still true that in no other branch of medicine is it so difficult to form one's own opinion, and that in no other branch is it so difficult to choose and to follow the correct road.

There are many obvious ways of reaching a diagnosis. It is absolutely wrong, as we have already suggested, to follow one symptom and to be satisfied with the results of the examination if it explains this symptom.

Owing to the fallibility of our judgment, and owing also to the chance of error in our physical examination, we must seek by induction, by the synthesis of our results and impressions, to outline the picture of the symptoms, and we next should test the fidelity of this sketch by subjecting it to the exclusion method.

This constructive method of diagnosis is similar to the formation of a mosaic, from which possibly one stone is lacking, or one is present which does not belong there. The more we change and sift the stones the better and more readily will we reach the perfect object. We change and rearrange our diagnostic stones in accordance with the data furnished us by our pathological and physiological knowledge. One stone fits into another, and obviously he will best attain results who is able to recognize the aptitude of one stone to lie in apposition to another. The wrong stones represent faulty premises, or those which are open to doubt. We should lay aside, at the outset, the obvious truths, then sift out the uncertain, when there remain only suppositions which are lacking in correct anatomico-diagnostic groundwork.

When we have formed our diagnostic picture, then we should ask, What does it, in its entirety, mean? We keep it entire before our eyes, and ask ourselves whence it most strongly points, and what conclusion is justifiable? If we possess many landmarks, and if we lack a few uncertain ones, then we may reach an opinion, but must still seek for the nature of the factor. We know the species, we must still seek the genus. Having formed our diagnosis, we must test it by exclusion, asking ourselves what else it might be, and why it was not different. Our mosaic is a tree; we must still find out what kind of a tree it is. We are familiar with a variety of trees, and we must ask, Is this tree a maple, an oak, a fir? We must give a reason for each exclusion, until we reach the correct species. For example, we have, by synthesis, reached the conclusion that the body of the uterus is bent backwards; we must by exclusion strengthen this diagnosis by remembering that bodies in the posterior portion of the pelvis may be: Tumors of the sacrum, of the intestine (scybala), of the ovaries, of the uterus (myoma, etc.), of the tubes and the ligaments, inflammatory exudations, hematoceles, retroflexion. The results of our examination exclude everything but the retroflexed uterus.

From the above remarks it is evident that exactness lies in the uniting of different results. These are arranged according to their importance and value. To test them it is essential to resort to every known method of examination, and in accordance with system. The physician further must be able to compare the anatomical and clinical data with one another. This ability is acquired not from books, but from careful practical study.

Whenever possible the rule should be to examine twice, particularly in case of tumors of the genitals, for even the skilled observer may reach results at the second examination which had escaped him at the first. Furthermore it is generally important to note the changes in movable organs, which result from their distension and that of their surroundings.

Frequently it is not possible to reach a certain diagnosis. In general the more skilled the observer the less likely he is to be ever sure, because he recognizes his own fallibility.

The forming of the prognosis and the treatment on the strength of a probable diagnosis is also a question of experience and of personal knowledge. Often by long observation and frequent examination a probable diagnosis is rendered certain, but too frequently it happens that the diagnosis is assumed as exact, and this is a frequent cause of error, which renders the special practice of gynecology, in particular, so difficult.

PART II.

General Gynecological Therapeusis.

CHAPTER XV.

INTRODUCTORY REMARKS.

THE symptoms from which women suffering from disease of the sexual apparatus complain are manifold, and yet there is no disease process which is peculiar to this system, for we find here all the pathological phenomena which are met with in other portions of the human body, as, for instance, disturbances in formation, in nutrition, and the resultant disturbances in function. Therefore the elements of general therapeusis are applicable in the treatment of the diseases of the genital organs, in particular since these diseases are generally accompanied by abnormalities in the entire body, and hence the one must necessarily be included in the other.

In earlier times there existed strong belief in the value of internal medication for the diseases of women, and a large number of specific drugs were described as applicable to the genital system, but to-day their number has become very small, although latterly there seems to be a tendency to return to internal medication.

We must sharply differentiate between internal and local therapeusis, as also many of the lesser operations, even as is the case in minor surgery. In this part of this book we propose to refer without any special system to the general measures at our disposal, which are applicable to special cases. We will speak of the rudiments of therapeusis, and describe the technique of their application to the treatment of the diseases of women.

The necessity of interference during labor taught the oldest races to place medicaments on and in the sexual apparatus aside from pregnancy, and here we find the dawn of local gynecological therapeusis. It must be considered as highly probable that the teaching of Hippocrates was largely based on the knowledge of the Egyptians, the Hebrews, and perhaps, in a measure, of the highly civilized Indians, with whom the art of obstetrics had reached a high grade of development with Susrûta's Ayur-Veda. In the writings of Hippocrates, of Soranus, Celsus, Moschion, Aretäus, Archigenes, Galenus, Aëtius, Paulus v. Aegina, and to a lesser degree in those of Albucasem, Avicenna, are found numerous directions for injections, baths, medicated pessaries, the application of medicaments to the cervix, the orthopedic treatment of displacements of the uterus, by means of the sound and mechanical pessaries. These writings contain a wealth of remedies, which almost entirely lapsed into oblivion, to be revived only in this century. Our reliable methods of examination date from the first decennium of the present century, however, and the dawn of methodical local treatment, and its essential outgrowth, intra-uterine medication, appeared only in the fourth decennium, when Lisfranc, Récamier, Clarke, Gooch, and later Simpson, Bennet, Kiwisch, Scanzoni and others, laid the foundation on which has been erected many of our best known facts. From the standpoint of modern surgery, therefore, we must consider our knowledge and treatment of the diseases of women as a child of very recent date, and we would remark here that the most striking results from gynecological therapeusis have been noted in those diseases to which pure surgical methods were applicable.

Although gynecological therapeusis must be considered an integral part of surgery, still it is necessary to describe the methods of use in the diseases of women, since certain of the measures are specially applicable to conditions of the genital organs which are frequently complicated, and seeing that the physical and psychical nature of woman impresses modifications on the methods in use in general surgery, modifications by means of which frequently alone we are enabled to attain our end.

In all medical and in particular surgical methods, we are far from exactly attaining our aim. To approximate as far as possible, however, there is requisite a degree of technical ingenuity which is obtainable alone through study and practical experience, and enables a man to change his plan of operation at once, in case he finds conditions different from the preconceived. It should be remembered how, in the diseases of women, the result frequently depends on trifles, and how prone women are to neglect matters which are disagreeable to them, although advised by their physicians; and further still how apt women are to judge of the knowledge and ability of the physician, by the readiness with which he undertakes and carries out matters of technique, and, therefore, how essential it is to render our most unpleasant therapeutic measures as acceptable as possible to the woman.

It is not alone in the treatment of tumors of the uterus and of the ovaries, of fistulæ, prolapse of the vagina and of the uterus, that we obtain most marked results by surgical means; the more frequent and not sufficiently remembered aims of our therapeusis are slight, not very apparent, and morbid changes in the genital system, malnutritions, changes in position, or in form, of such slight degree as to almost escape our ken, and yet the outcome of severe symptoms, which eventually may undermine the physical and psychical well-being of the woman, such are the affections which yield no less readily and brilliantly to direct medication than to the major operations.

The endeavor to separate surgery from medicine is a vain one. The sole difference is that the surgeon possesses greater technicality in a certain direction than belongs to the physician, since his time, the bent of his mind, his desires, his talents, are expended in that direction. This is above all true of the gynecologist. Here, more than in any other branch of medicine, is it essential that the specialist should be physician as well, in case he hopes to diagnosticate and to treat disease correctly. A large proportion of the diseases of the genital organs depends on disease of the system in general, or at least of remote organs, and scores of genital affections lead to disturbances in one or another of the organs of the system in general, which may be much more important than the local disease. Women suffering from anomalies in the genital organs are usually women in whom it is frequently very difficult to differentiate the cause and action of the varying affections. Since the teachings of modern gynecology have not as yet become generally disseminated, in particular among the older physicians, it is not uncommon to see diseases fruitlessly treated by internal means for a long time when the source of the affection lies in the genital organs. Again, certain affections so constantly accompany anomalies in the genital apparatus, that we are prone, on the other hand, to seek the cause locally where it does not exist, and to overlook the primary cause which is in some other organ. Such is the case particularly in women who seek the physician with symptoms of gastralgia, nausea, etc. Every imaginable treatment is instituted without effect, until the local examination reveals a uterine flexion or some disease of the genitals, the cure of which eventuates in the disappearance of the symptoms. In other instances we find, in addition to the gastric disturbances, greater or less symptoms from the side of the uterus, inflammations, changes in position, etc., affections which are wrongly considered as the primary cause, and are so treated without avail, because possibly the local disease is not the cause but only the sequela of the general condition of the patient, the result of the defective nutrition from the state of the stomach. Further still, constitutional affections play a not unimportant *rôle* in etiology, and, therefore, in the radical treatment of diseases of the genital organs we must take account of the influence of scrofula, tuberculosis, hæmophilia, chlorosis, syphilis, a number of acute and chronic diseases (acute exanthemata, heart lesions, etc.), the connection of which with the affections of the genital organs cannot be traced directly. Frequently also the gynecologist is called upon to differentiate affections which are included in general medicine, such as hysteria or psychoses, the result of paralysis, etc.

Not so many years ago, especially in Germany, where local treatment met with slow acceptance, the internal methods of treatment were in vogue. Shortly afterwards, particularly in England and America, the mechanical methods of treatment were warmly received, and to an extent hardly justifiable, but to-day the happy mean between the two is sought.

Opposition and partisanship obscure frequently the vision of the physician, with the result of discredit to medicine, and of harm to the patient with the cure of whom we should be busied as our chief aim. If we hold this aim in view, if we base our practice on the data of experience, then unquestionably all cases suitable for local treatment will thus be the better and the more quickly cured, and the reverse holds true for the cases where other treatment than the local is called for. These views are daily gaining ground, and the number of women are daily on the increase who resort to their physician for local treatment.

Gynecological therapeusis requires, as we have stated, a number of measures and appliances which are not at the disposal of every physician. This is one reason likely enough for the opposition which still exists in some quarters. Such treatment requires much care and trouble, and much time both of the physician and of the patient, which the one or the other may be unwilling to give. Further, the slightest manipulation may be the cause of injury, aside from any responsibility on the part of the patient or the physician. The simple vaginal injection, the application of a medicinal substance to the diseased mucous membrane, the insertion of a pessary, may be followed by greater or less outward results, to say nothing, in general, of mechanical or intra-uterine treatment, or of the minor and major operations. Hence follows the necessity of carefully bearing in mind the indications and contra-indications of any procedure, and of acting always in strict accordance with general surgical principles. Only when it is apparent that our aim cannot be fulfilled in any other way, is it justifiable to think of operative interference, although of course we do not intend to imply that, even before such interference, every other method should have been tried

In addition to the general indications and contra-indications there are a number of matters to be considered in the treatment of the diseases of women which depend on the locality of the field of operation, and on the psychical state of the women. We not infrequently witness most untoward effects on the general condition, resulting from local treatment, for the reason that irritation of the genital apparatus is present, which nullifies the entire effect of treatment. In general it may be stated that excitable women possess an easily irritated genital system, although there are so many exceptions to this rule, so that the physician is spared the annoyance of seeing his patient becoming worse rather than better, from his local treatment, and that the local affection is being intensified rather than ameliorated. We frequently see a catarrhal process increase under treatment, an ulcer remain stationary in its progress towards cure, and again often does betterment or cure follow on cessation of all local treatment.

Many insignificant manipulations have also frequently an unexplainable effect on the nervous system. Aside from the fact that attacks of hysteria, convulsions, loss of consciousness, great hyperesthesia, may manifest themselves during an operation, local treatment as well often leads to an exaggerated general sensibility, to hysterical manifestations, even to mania, unless the treatment is desisted from and the requisite general measures are substituted. The fear of manipulation, the non-preventable irritation of the sexual organs, frequently leading to sensual manifestations, the repulsion against manipulations, the outcome of modesty, such and the like must be held as explanatory for such occurrences. When such general manifestations appear, it is advisable to desist from local treatment, and turn our attention to calming the nervous system. The local and internal use of opium, belladonna, morphine—although always with great care, seeing that hysterical individuals readily acquire the opium habit—the bromides, chloral, baths, in particular the hot shower bath, change of air and food, abstinence from intercourse, the inhalation of oxygen, which has rendered me marked service, such are the general means at our disposal. Cold-water cures are of great utility, also, although we must carefully differentiate our cases, since, frequently enough, such cures simply intensify the complaint.

Since the above-mentioned manifestations are largely psychical, it is apparent that no gynecological treatment should be instituted without taking into consideration the psychical state of the patient. There are patients, although not so many, in whom at the outset local treatment is not permissible, and who must be prepared for it by a long-continued use of remedies adapted to psychic or general disturbances. The best way to obtain the requisite psychic state, is to make clear to the patient the reason for the treatment to be instituted. This should be the physician's first endeavor, and here the personal equation plays a marked *rôle*. If the physician possesses the patient's confidence, then he succeeds at once without trouble; in instances where he fails, it is advisable to postpone the attempt for awhile, unless the indication be urgent, and wait until the increase in the symptoms brings the patient herself to him, and in a condition to grant without the asking what she previously had refused. Every patient should be made to understand the absolute necessity of intervention, and that this may be readily done and with considerable safety. Frequently it is advantageous to explain the entire procedure to the patient, even referring to the possible untoward consequences; on the other hand, with a different patient it is better simply to sketch the main points and not to enter into details. How often does it not happen that we meet with patients who refuse the insertion of a pessary, or local venesection, and yet if we do them without their knowledge they feel so much better that, when informed as to what has been done, they thank us for acting against their wishes. In general, however, on moral and politic grounds, it is better to do nothing in case of rational patients without ample explanation beforehand.

The physician must determine for himself in a given case how wise it is to explain the nature of an operation to his patient. He must gain her confidence, in order that she may work with him, and keep at a distance from her as far as possible disturbing factors. There are certain operations where the results, aside from favorable termination, are in doubt, such as the removal of many new growths, operations for fistulæ, for amputation of the cervix, for prolapse of the uterus, and here good results often do not follow, and the subjective symptoms are not relieved, and yet in this lies the measure of the worth of the procedure in the patient's eyes. In many instances we can simply speak of relieving what appears to us to be the pathological cause, in others we cannot even do this, and in many the physician must not refer even to the possibility of cure. Patients object so much to being examined, that the physician, as far as he in honor consistently can, should mention only such data as he is satisfied are entirely justified.

The physical preparations for local treatment require the removal of all the causes which may interfere with it. Weak, badly nourished individuals are to be subjected to the proper medicinal and dietetic measures, are to be sent to cures, to the mountains, to the sea-side. Strengthening of the system in general is not only a good measure for preventing the untoward effects of local treatment on the nervous system, but it also has a valuable influence in preventing infection of wounded surfaces. Local preparatory measures are also in place when it is necessary to overcome conditions which interfere with local treatment. Cases of excessive hyperesthesia of the introitus vaginæ call for the topical use of narcotics, baths, etc., as preparatory measures; narrowing of the genital canal, in particular the introitus and the vagina itself, cicatricial contractions call for manual or instrumental dilatation preparatory to fistula operations for example. Baths must be ordered not alone to get the skin in good condition, but also to accustom the patients to the degree of cleanliness which is requisite before further treatment can be instituted.

In case it is a question of measures which are called for by stringent, vital indications, the proper time for operation or for treatment must be chosen. In hospitals we should beware of occasions when infectious diseases are prevalent, such as erysipelas, diphtheria, puerperal fever, etc. The season of the year must be taken into account, in so far as in winter it is difficult to secure proper cleanliness and ventilation of the surroundings, while in summer the patient's general state is depressed, wounds heal badly and it is difficult to maintain them in a healthy state. The spring and the early portion of the summer are not only the best seasons for hospitals, but also for private practice. As for private practice, we are obliged to take into account the business, the family affairs of the patient, and, if it be an indifferent matter as regards result, then it is a good plan to adapt the time to the patient's wishes, for thus she will be more tractable in every way.

Whenever possible, local treatment should not be undertaken during pregnancy. Even the slightest measures, such as vaginal injections, may interfere with its course, aside from the fact that during pregnancy the woman very readily falls a prey to inflammatory affections and to septic infection. We should beware in particular of the early period of pregnancy, when miscarriage readily occurs, and if treatment is being instituted we must remember the possibility of conception occurring, and be prepared to stop treatment. All the more care is requisite in this respect, since women often know that our therapeutic measures, in particular the intra-uterine, may cause miscarriage, and many will insist on such treatment in the hope of being relieved of the fruit of their womb.

The risk from operations during pregnancy have been overestimated, and they are not so great that we should not resort to them in many instances of tumors, the growth of which may later either cause premature labor or necessitate difficult operative procedures, or the Cæsarean section, particularly in case of ovariotomy or extirpation of carcinoma during pregnancy. (According to Cohnstein's small number of data, the risk to the mother of surgical operation during pregnancy interfering with its course, is essentially heightened, and the more so at the third, fourth and eighth month.)

During the puerperium local therapeutic measures are often called for. The vulnerability of the patients seems to lessen as the puerperal period lengthens; still there is ever a great tendency to inflammatory affections from the sub-involuted condition of the genital organs. Injuries and perforations of the uterus generally occur during the puerperal state.

The period of lactation should not be chosen for major operations, because the necessary rest in bed after them and the dieting will have an unfavorable effect on the secretion of milk.

The menstrual period was for a long time with many physicians a reason for the cessation in the use of even the most harmless internal medicaments. Although such an extreme is not essential, still, owing to the hyperæmia which precedes for a few days the onset of the menses, there exists increased vulnerability of the genital organs, and therefore this period had better not be chosen for the institution of local treatment. Under certain circumstances, however, this change in the genitals is what is wanted, and Simon has found that the increased vitality of the tissues accompanying the menstrual congestion was favorable for union *per primam* after plastic operations. Generally, it may be said that the few days after the cessation of the menstrual period are the most preferable for the beginning of treatment, since then the conditions are as far as possible normal, and the greatest uninterrupted space of time is at our disposal.

Even after the menopause operative procedures are often called for. Tumors and prolapse are of frequent occurrence. Age itself is only exceptionally a contra-indication to difficult operations, although we must be careful to build up the strength of the patients. Union by *prima intentio* appears to me to be a trifle less likely at the time of the menopause, possibly because the retrograde metamorphosis interferes with the vitality of the tissues.

The time of the day which should be chosen depends on a number of circumstances. In case of a major operation the morning and forenoon are certainly preferable, in particular when anesthetics are to be used. The patients are then refreshed from their sleep, and are not obliged throughout the entire day to keep their thoughts on the operation which they fear. Further, untoward after-events, such as colic, hemorrhages, etc., will then occur during daylight when the aid of the physician is more readily assured, and this thought has a good effect on the patient. Still the physician is obliged to resort to various manipulations at any time according to the state of the patient, the locality, the light, the surroundings, and then again according to the exigencies of his personal practice.

A large majority of our patients will be treated in the office. Applications to the vagina and the cervix, the insertion of pessaries, sub-cutaneous injections, local venesection and scarification of the cervix, even intra-uterine applications, may be made in the office. The patients of other specialists, such as the ophthalmologists and otologists, have certainly the advantage over those of the gynecologist, that the organs to be examined and treated are less likely to injury by implication of neighboring structures. In the necessity of handling a large material we are very likely in our office to resort to some procedure which may be followed by unpleasant, even dangerous results. Great pain, uterine colic, collapse, nausea, vomiting, nervous crises, hemorrhage, inflammatory symptoms, any one of these not infrequently occur, and not only are the patients made anxious, but the physician as well is troubled by the onset of such symptoms in his dwelling, and is obliged to care for the patient until it is safe to send her home. With women whose vulnerability we have not tested we cannot be too cautious, and intra-uterine or minor surgical measures had better not be instituted, certainly in the beginning of treatment, in our office unless the indication be urgent. We must always bear the possibility of these occurrences in mind, and have at hand narcotics and restoratives to be used if need be.

The average time required for the cure of office patients is considerably longer than that for those who are partially or entirely seen at their houses. In the case of the former there is greater risk of damage, the visits are apt to be irregularly made, and the physician cannot himself be certain that his injunctions are faithfully obeyed. With us, further, it is a disadvantage that the patients object to a third person being present as an assistant in our office or at her house, and yet there are many procedures which cannot be rightly or at all resorted to without such an assistant. In hospitals, of course, it is very different. It should be stated, however, that a properly constructed examining table helps us to overcome many of the obstacles.

No general rules can be laid down as to whether during treatment rest in bed is necessary. At times rest is injurious, although it was formerly the custom to treat patients with uterine displacements by rest in bed for months. Thus the patient's appetite, the functions of the bowels, the body nourishment, the psychical being, are altered for the worse. There is room, however, for much differentiation: many women after the slightest procedure, such as cauterization of the cervix, must lie in bed for days in order to recuperate, while others may undertake almost anything immediately afterwards without the slightest risk Since, however, our rule should ever be "non nocere," it is safer, at the outset certainly, to insist on too much rather than on too little rest. With the exception of acute exudations, which of themselves forbid much motion, and of hemorrhage, we may estimate the patient's ability by her sensations, and in chronic cases it is well to allow as much freedom of movement as the patients find they can take without exaggeration of their pains. Sometimes active motion is borne better than the passive of riding. Great physical effort, climbing stairs, long standing, heavy work, in particular the sewing machine, obviously must be stringently forbidden during the course of local treatment. Even where exercise seems beneficial, it is advisable to insist upon rest a portion of the day. In case of pelvic congestion rest in the recumbent position for at least one hour daily is of advantage.

Owing to the difficulty of enforcing such rules it is not surprising that we obtain better results in patients who can be treated away from their household cares and duties. Cohabitation is to be allowed only very rarely; and then rather as a psychical measure. Generally it has an unfavorable influence, while it increases local congestion as well as the nervous excitability, and further if intercourse be allowed the physician must always during treatment bear in mind the possibility of his patient having become pregnant.

The diseases of the female genital organs, and the injuries at the hand of the physician, rarely remain localized. These organs are in close connection with others, and therefore they are apt to partake in inflammatory affections, in particular the peritoneum. This risk is always imminent, and should ever be borne in mind.

CHAPTER XVI.

ANESTHESIA.

IT is impossible to state at the outset how much pain our procedures are going to cause. Particularly in women are we liable to error in this respect. Slight, tenderly nurtured women often readily bear the most painful operations without the slightest complaint, while robust and courageous-looking women react greatly on the least manipulation. Here two factors are always to be taken into account: the individual sensibility, which causes the patient to shrink against her will, and the influence of psychical causes. We frequently meet women who will bear with great courage long-continued and intense labor pains, and yet will cry out against slightly painful procedures. Thanks to Jackson's discovery, pain is lost at operations, and the indications for operation have been essentially widened, and in gynecology it is often not a question of vital indications, but only of operations which are undertaken to allay greater or less complaints.

Whenever possible we take care to make our procedures as painless as possible. The effect of great pain, indeed of the fear of pain, on the nervous system, may be followed by the most serious results, and if the use of chloroform were absolutely free from danger, then would it be resorted to much more frequently. Since, however, narcosis very exceptionally ends fatally, besides being accompanied by a number of unpleasant effects, it should only be used under strict indication.

In general the indication for anesthesia lies in any procedure, operative or diagnostic, which is so painful or unpleasant as to offset the disagreeable effects and the dangers of narcosis. Such are the majority of injuries of the external genitals, and also examination in the presence of ulcers, fissures, persistent or contracted hymen, vaginismus. The vagina is generally but little sensitive, still the majority of plastic operations should be performed under anesthesia. In the majority of women the cervix is scarcely at all sensitive, and in the absence of inflammatory affections it may be cut or cauterized without the slightest evidence of pain. In case of marked prolapse of the uterus, however, where the cervix or its canal are operated upon, the pain involved is nearly always great. Anesthetics should also be used when we desire to cause relaxation of the abdominal muscles for the purpose of palpation, in the examination by the rectum or urethra, in case of spasmodic stricture of the various orifices, in the reposition of displaced organs. General hyperesthesia of high degree necessitates anesthesia, and in case of very nervous women we can rarely accomplish much without chloroform.

We occasionally meet patients who are afraid of chloroform, but these are in the great minority, and frequently the mere thought that the operation will be rendered painless will influence in favor of it.

The same contra-indications to anesthesia exist in gynecology as in general surgery. Great weakness of the heart, as after profuse hemorrhage, fatty degeneration and acute diseases of the organ, are contra-indications, as also diseases of the lungs, which interfere with the respiratory act, struma, many brain and arterial diseases. Otherwise anesthetics may be administered for any operation and in nearly any position of the body, even in the knee-chest when we use a proper fixation apparatus, like that of Bozeman, for the patient.

Anesthesia should never be induced in the absence of a competent assistant, who should be supplied with the articles which might be needed in an emergency, such as tongue depressor, laryngeal catheter, medicinal restoratives. It is well also to have an induction battery at hand.

Of the large number of anesthetic means, only a very few are in general use: chloroform, sulphuric ether, which latter is growing in favor. Simpson, and Hegar and Kaltenbach, advocated chlormethyl because it has no depressing effect on the heart; Heckermann used bromethyl.

Chloroform (purified) is either used alone, or mixed with ether, and absolute alcohol. I am in the habit of using Billroth's mixture, three parts chloroform, and one part each ether and alcohol.

Mixed narcosis by means of chloroform and morphine, or, to a less degree, chloroform and chloral, has frequently decided advantages. During the stage of excitement or even of toleration, an hypodermatic injection of morphia may be administered to quiet the psychical disturbances, to shorten the period of excitement, and then but small amounts of chloroform are needed for prolonged anesthesia, which is a great desideratum in confinements and during plastic operations.*

The method of inducing anesthesia is sufficiently well known. For many operations deep anesthesia is not requisite, but in case of very painful procedures, as, for instance, the introduction of the entire hand into the rectum, it is.

In addition to general anesthesia, there are a number of means for the production of local insensibility. Owing to the risk and unpleasant consequences of general narcosis, it would be advisable to substitute local, wherever possible; but in gynecology this must be limited to minor measures, such as the opening of abscesses, and to localities where the application of the means is possible. Among these means we mention: the application of ice, of evaporating lotions, the ether spray by means of Richardson's apparatus, and the chloroform vapor method of Hardy. Scanzoni and Veit have often used this method, and in my hands chloroform has rendered valuable service for the alleviation of hyperesthetic conditions, such as pruritus, and in one instance of neuralgia of the pudic nerve. Aran's suggestion of using chloroform vapor in the uterus has not been adopted. Simpson, Demarquay, Churchill, have advocated the use of sulphurous acid vapor for the relief of the pain accompanying carcinoma. Scanzoni noted one death and Bernard toxic effects from the procedure, and it is, therefore, not to be counselled.

The application of narcotics locally is not marked in its effects. Cocaine, which has latterly proved of such utility in ophthalmology, appears to be also of value in gynecology.

CHAPTER XVII.

THE USE OF ANTISEPTICS.

ALTHOUGH Semmelweiss' discovery had some influence on gynecology, as well as later the precepts of Lister, it is only within the past few years that antiseptics have been introduced into our branch of medicine. Here as elsewhere it is requisite to make our procedures as safe as possible, especially when, aside from laparotomy, it is a question of affections which of themselves do not endanger life. It is the physician's business to surround his methods with all the safeguards in his power, and fortunately this is in general the customary rule. Certainly, with the modern methods of wound treatment, the responsibility of the physician is increased, and after every mishap it is his duty to determine if he were at fault, and to ask the questions, Where lies the blame? Whence came the infection?

It is not only operations which carry with them the risk of infection: every one of our manipulations, in particular the instrumental, may be the source, and our care should be the greater seeing that our methods of examination, be it by the finger, the sound, or the speculum, must be used in a canal which cannot with certainty be completely disinfected. Seeing that we are not in the position to institute every gynecological examination in a hospital, or at least in the presence of a sufficient number of assistants, risks always accompany it which it is our business to reduce as far as possible to the minimum, by paying attention to stringent cleanliness and by abstaining from every non-requisite manipulation.

At first sight it is surprising that in pre-antiseptic times there were relatively few infectious diseases, and true enough still severe cases of sepsis are rarely met with after the majority of operations, but very frequently do slighter degrees of infection, such as pelvic abscess, occur, and for these we must in general bear the blame. The real reason why infection is not of frequent occurrence lies in the fact that the vagina and the uterus are shut off naturally from the external atmosphere, and this is why polypraxis in after-treatment is so frequently followed by untoward results.

Prophylaxis is the basis of the aseptic treatment.

Major gynecological operations, whether bloody or not, require that the patient be placed in bed immediately afterwards. There are no operative procedures which may not be undertaken in an ordinary private dwelling. One or two convenient, light, and airy rooms are requisite, as also experienced nurses, a table, the necessary dressings, disinfection means, the ready accessibility of a physician, these are always obtainable at the expense of time, care, and money. It is further true that the healing process may take place as readily in a private dwelling as in the best hospital, and this alone is sufficient reason why operations should be undertaken at the patient's home. There are numerous disadvantages, however, which render it essential that the majority of operations should be performed in a hospital. Many operations are of such importance that the choice of place for operation is of the greatest consequence, in particular in case of laparotomy and the major plastic operations, where the wounded surfaces are in particular prone to infection.

In many hospitals there are separate divisions for the diseases of women, but in a few countries the gynecological and the obstetrical services are conjoined, and this is a dangerous state of affairs. Many of the diseases of women are associated with infectious material, as, for instance, sloughing carcinoma, sarcoma, fibroma, as also pelvic abscesses and hæmatoceles, and it is advisable that such patients should not be treated in the same wards as operative cases. The proper course is not only to separate such cases, but also to have distinct medical and nurse staffs, as is the case in Berlin. In obstetrical services, again, the puerperal diseases are prolific sources of infection, and it is therefore advisable to follow Hegar's advice and to separate the gynecological cases from the obstetrical, as well as to sharply differentiate the former. In order, further, to obtain as natural healing of wounds as possible, our wards should be far removed from all epidemic and endemic septic sources. Small pavilions, separated from the main hospital, are far preferable to large hospitals, whether public or private.

The operation itself should be performed in a special room which contains absolutely nothing not essential to the operative procedure. The floors should be constructed of non-absorbent material, asphalted, and with a gentle incline towards one corner or the centre for the purpose of surface drainage. Before every operation the walls and ceiling and floor should be thoroughly washed and the room well-aired. A few hours before the operation the room should be disinfected by chlorine or sulphurous acid fumes, or by the carbolic spray. Hegar recommends in particular the burning of sulphur for the purpose of thorough disinfection.

The operating table should be simple in construction, of iron or wood, so that it may be carefully scrubbed and disinfected. It should be covered with rubber cloth, which is folded in a large gutter at the anterior end of the table, whereby in operations on the perineum and vagina the blood and fluids are conducted to the floor. Before and after every operation this cloth should be well scrubbed with soap and water, and then washed with a 5 per cent. solution of carbolic. Everything in the operating room should be as simple, and such articles as curtains, etc., do not belong in it.

In order to assure absolute absence of sources of infection, the room to which the patient is taken after operation should be carefully cleansed and aired, and be as free from dust as possible so as to prevent infection when the dressings are changed.

All the instruments must be absolutely clean, and this we are able to obtain provided we use metal instruments with smoothly polished surface. We should have at hand, further, only such instruments as we are likely to need, and such is my custom. The handles should be of steel, the whole in one piece, polished and nickel-plated, or if they are thus too heavy, the handles may be of copper plate, nickled, as Thürriegl has constructed them. Every unevenness, etc., may be a source of infection. The cutting instruments should be cleansed with soap and water, placed in 5 per cent. carbolic or in absolute alcohol, and then in a weaker carbolic solution. This process is likely to damage them somewhat, but it cannot be helped. After every major operation every instrument should be sent to the maker for polishing. Blunt bent instruments, hooks, forceps, and scissors should be so articulated as to be readily taken part. Only thus is it possible to thoroughly cleanse the lock. Even the needle-holder I am in the habit of using has no grooved surface. Other metal instruments, catheters, needles, dilators, can only efficiently be disinfected by means of heat.

Non-metallic instruments, those of hard rubber, and elastic catheters, cannot be subjected to such a process, and infection is very likely to occur through them owing to the great tenacity of the *materies morbi.* They must be cleansed by means of one of the methods to be referred to, and then placed in carbolic solution. Whenever possible such instruments should be dispensed with and those of glass or metal used in place of them.

The vessels which hold the solutions should be constructed of porcelain or of glass. Metal basins should be made of one piece, else edges may project and serve as a lodging-place for dirt. Glass and porcelain may be cleansed by means of mineral acids, and metal cannot.

The water used, especially in case of laparotomy, should be boiled, and then diluted by some antiseptic. Sponges should be rejected for ordinary use, and only in laparotomies must they still be endured. According to Fritsch they may be cleansed only through complicated disinfecting measures, and should then lie for a fortnight in 5 per cent. carbolic, and after each use they should be subjected to the same processes.

Absorbent cotton, carbolized, salicylicized or mineral wool, should be used for cleansing purposes. The towels and compresses must be changed after use. In operations, especially laparotomy and the major plastic, they should be counted and washed separately. Before using, the compresses should be placed in chlorine water, sublimate or carbolic solution, etc. For the dressings gauze, jute, wool, cotton, etc., should be used impregnated with carbolic, salicylic acid, thymol, iodoform, etc.

An essential question is the suture material. Metal is the most readily cleansed, and is, therefore, not apt to cause suppuration. It is not suitable for the purpose of ligature, however, for it readily breaks and the tissues are irritated by the broken ends. Surgical silk is suitable both for ligature and for suture, although it must be carefully disinfected. The silk should be wound on glass rods, and boiled for two hours (Czerny, Fritsch) in 5 per cent. carbolic, adding now and then sufficient concentrated acid. The rods are then to be permanently kept in glass jars containing 5 per cent. carbolic, and the silk may be unwound without removing the rods.

Catgut, plain, sublimated, or chromated, has the great advantage that it is absorbed, so that it is not necessary to remove the sutures, but it is not any more readily disinfected, as Zweifel and Volkmann have proved, and it breaks so readily that we are obliged to use the larger sizes. For the purpose of the running, sunken suture, however, catgut is indispensable. I use silk almost entirely, and have left it for months in the tissues after plastic operations. Silver I rarely use for suture, but generally for controlling laminaria and tupelo tents.

The physician should pay most special attention to his own cleanliness and to that of his assistants. The operator may be the carrier of infection in the first place through personal disease, and in the second place in that infectious material from without clings to him. In the first category are to be ranked abscesses, boils, exanthemata, in particular erysipelas. For this reason, and also because when sick a man is not in full possession of his powers, operations should not be performed under the circumstances. The infectious material which may come from without is incalculable. The most common sources are contact with patients suffering from gangrene, erysipelas, acute exanthemata, puerperal diseases, suppurating tumors, and the dealings with cadavers or pathological specimens. In case such diseases are among our patients it is advisable to postpone operations for a few days, as was Spiegelberg's teaching in labor cases. It is preferable to be too careful than not to be enough so. For my part I will not attend a labor case or operate on the same day that I have come in contact with anything infectious.

The source of contagion is, however, not always so evident; it is in ambush everywhere, even in the handshake of an unclean individual. Before every operation, therefore, a full hot bath should be taken; the hair, in particular the beard, is to be carefully washed, the teeth brushed (Mayrhofer wears a respirator). Immediately preceding operation the hands and forearms must be scrubbed with soap and water, in particular the nails, which should be rubbed and scraped preferably with an ivory knife, since a steel instrument roughens them. The hands are then to be dipped in 5 per cent. carbolic, 1 per cent. thymol, 1 per cent. sublimate, permanganate of potass, after which latter it is requisite to place then in a dilute acid solution. Many operators are obliged to dispense with carbolic owing to the sensitiveness of their skin and the resulting eczema. During the operation a deep porcelain or glass vessel should be near the operator filled with disinfecting solution, in which he may occasionally dip and rinse his hands.

The clothing may be carriers of infection. It should be completely changed before any major operation, and over it should be worn a long apron, of linen or, better, of rubber, reaching from the neck to the knee, and this apron should be carbolized freshly before use. The sleeves of the operator's undergarments should be rolled up above the elbow. Gloves should never be worn, since they cannot be disinfected and may carry infectious material in their seams; further, the disinfecting action of the air and the light on the hands is desirable, as is proved by the readiness with which exposure to these agents rids the hands of odor.

The assistants must be as disinfected as the operator. No assistant, no visitor, should be allowed to be present at an operation who has on the same day come in contact with infectious diseases or cadavers. It is preferable to have an independent staff for assistance in aseptic operations. It is useful in case of many operations to have an assistant present whose sole duty it shall be to attend to certain matters, such as catheterization, the manipulation in the vagina during laparotomy, the pushing forward of the vaginal wall from the rectum in case of colporrhaphy, etc. The assistant who attends to the anesthesia should have nothing to do with the operation itself, seeing that he may not be completely aseptic owing to the patient's vomiting, etc.

An essential matter is the subjection of the patient to a preparatory course of disinfection. Since the majority of gynecological operations are not extremely urgent, we generally have one or two days in which to prepare the patient, and on this preparation depends largely good convalescence and union *per primam.*

The patient should be carefully examined for the presence of infectious affections. Ulcers, blennorrhea, etc., on other parts of the body should be treated beforehand. Before operation the body should be cleansed; the external genitals, in particular the parts covered with hair, should be scrubbed with soap and water, and the hair shaved from the parts which are to be operated upon. The field of operation must then be carefully disinfected with 2 to 3 per cent. carbolic solution, or sublimate. The abdomen should be covered with a carbolized compress before a laparotomy (Billroth), and only removed at the time. The vagina should be douched a number of times daily with some disinfecting fluid, the patient occupying the dorsal position, and the thick mucus should be removed from the cervix. After the last douche I am in the habit of having the vagina filled with carbolized glycerine tampons, or preferably with 50 per cent. iodoform gauze. The uterus should be washed out through a double current catheter, and an iodoform pencil introduced into its cavity. In case an infectious growth, like cancer, is to be excised, then its surface is scraped with the curette and is cauterized in order to avoid infection of the wound at the time of operation.

From the beginning of this preparatory treatment, the patient must be clothed in clean, fresh garments, and remain only in clean localities.

The use of the spray during the operations is generally, from their site, impracticable. Only in case of laparotomies and of operations on the perineum is it feasible. Even in these cases, however, the majority of operators have dispensed with it, although such authorities as Spencer Wells and Keith still favor it. With the majority I believe it theoretically correct not to disturb the atmosphere during an operation. In case all the essential aseptic rules have been enforced, we may well dispense with the spray, and this is an advantage, in particular, to those operators who wear spectacles. Still for one to two hours before the operation the room should be kept filled with 5 per cent. carbolic spray, but this step should never cause us to dispense with the slightest aseptic procedure.

In case of the major operations on the perineum and in the vaginal canal Schröder recommends highly permanent irrigation—that is to say, the field of operation is kept covered by a stream of weak disinfecting solution by means of an irrigator. Since the vagina has been thoroughly disinfected, however, I do not deem permanent irrigation essential, and I content myself with frequent douching of the field of operation, for by this means we can better cleanse the surface than by a slow permanent stream, and it must be slow else it will interfere with the vision of the operator.

There are many agents which may be utilized for disinfectants. To say nothing of those not generally used, menthol (MacDonald), naphthalin (Anschütz, Fischer), sub-nitrate of bismuth (Kocher), the most valuable are carbolic acid, salicylic acid, thymol, chlorine water, permanganate of potass, zinc chloride, sublimate, iodoform.

The uses of carbolic are generally recognized. It forms the basis of Lister's method. For purposes of injections it is used in the strength of 1 to 2 per cent., for washing the hands and instruments 5 per cent., as also for the disinfection of silk, sponges, and utensils in general. Its long-continued use is destructive to the epithelium and the epidermis, and may cause toxic symptoms. Its effect on micro-organisms is further inferior to those of other agents, and it is not at present, therefore, so extensively used. When mixed with fat to form the carbolized oil its disinfecting properties, as Koch has shown, are slighter. The mixture with vaseline (10 per cent.) is preferable. Anointing the finger with fat simply renders it slippery. The finger should be carefully disinfected beforehand.

Salicylic acid as a disinfecting agent is frequently used in dressings, or a solution may be made, as Fritsch recommends, by dissolving gr. 45 in a little alcohol and adding this to a quart of water.

Thymol is favored particularly by C. Braun, and is used in 1 per cent. solution for irrigation and for disinfection of the hands and instruments, and he prefers it to carbolic in that it does not give rise to eczema.

Zinc chloride is used by Kocher in .2 per cent. solution for irrigation, and in 1 per cent. solution for disinfecting septic wounds.

Permanganate of potass in 1 per cent. solution is an excellent disinfectant, since it gives up its oxygen for oxydizing organic bodies The change in the color, as long as this lasts, proves that oxydation is taking place. Dilute and mineral acid will remove the brown stain caused by the agent.

A valuable antiseptic agent, long used as a deodorant, is chlorine water, which Hegar and Kaltenbach recommend. The difficulty of transporting it and its unpleasant odor are in the way of its general acceptance. I have used it in many unfavorable cases.

In 1881 Koch proved the destructive power of sublimate on micro-organisms. Weak solutions (.1 per cent.) are sufficient to destroy them. Toporski, Bröse, Kehrer, Kaltenbach, Hegar, Schatz, and others, at once introduced it into gynecology, and the general opinion is that it is superior to all other agents. Solutions of 1 to .2 per cent. are used for disinfecting the hands, and of 1 to .2 per cent. for purposes of irrigation. It cannot be used to disinfect metal instruments, however, not that it quickly destroys them, but the solution loses its strength and its virtue, seeing that the mercury is deposited on the metal. Only glass and porcelain vessels can be used with it, and the injection tubes must be of glass.

The use of sublimate in gynecology is hence limited, but in obstetrics it finds its full place, although we must not forget the possibility of toxic effects. The solution is kept ready for use by making a 5 per cent.

solution of sublimate in alcohol, and adding a sufficient amount of this to a quart of water to make .5 per cent. to 1 per cent. solutions.

In gynecology, where generally we deal with wounded surfaces in cavities, iodoform is the best antiseptic. Since its recommendation by Billroth and Mosetig I have used the drug frequently as a dressing, and I have found it a most valuable agent in the aseptic treatment of injuries to the uterus.

After the appearance of Mosetig's article, many authorities at once spoke in its favor, for instance, Rehm, Billroth, Demarquay, Fritsch, Frühwald, König, Leisrinck, Martin, Mikulicz, Neuber, Nussbaum, Sänger, Schücking, and others. The typical Lister dressing was dispensed with in great measure, and the wounded surfaces were either covered with pulverized iodoform, or with gauze impregnated with the drug. The great enthusiasm in its favor, however, has been checked by the observance of toxic cases. The temperature rises, although the wound is healthy, the pulse increases in frequency, the intellect is clouded, in extreme cases there is collapse, acute delirium, deep coma, speedy fatal termination. Schede, König, Kocher, Mikulicz, Goldschmidt, and others, have reported such cases of poisoning; König, in 1882, found thirty-two reported instances; in the same year Kocher collected twenty-three, and for this reason gave up the drug and substituted sub-nitrate of bismuth in its place. Many authorities, however, notwithstanding the danger of poisoning, will not dispense with it. In 1882 Mosetig in 7000 cases had no instance of poisoning. He cautions against the simultaneous use of carbolic, seeing that it may cause kidney inflammatory troubles, which may prevent the elimination of the iodoform. For the past five years I have used iodoform and iodoform gauze, and only once, after an intra-uterine application of 150 grains, did I notice slight affection of the sensorium.

Even from the use of small quantities of iodoform toxic symptoms have been observed, but in general the chances of poisoning are in direct relation with the amount used, and iodoform gauze carries with it less risk than the powder. It goes without saying that on the slightest symptom of toxicity the drug should be intermitted, and whatever is on the wounded surface should at once be removed.

Iodoform is applied in powdered form by means of an insufflator, of which there are many forms, or else in the form of the ether-iodoform spray. In the uterus it is preferable to use iodoform pencils. Cavities are best filled with iodoform gauze. The opinion that it is not possible to bring iodoform into contact with the entire endometrium does not seem to me to be well founded. The drug is disseminated by the uterine muscular activity. Latterly, in a case of retention of a placental remnant, after two intra-uterine injections I inserted each time sixty grains of iodoform, and when the remnant was removed it was saturated with the drug even as would be a sponge.

A stringent objection to iodoform is that it does not suffice for overcoming sepsis. This is valid in that it possesses no caustic effect, and in essential cases it must yield to other antiseptics and to caustics. As a prophylactic agent, however, I must rank iodoform above all others. Since the introduction of iodoform-tannin gauze, further, we possess in addition to disinfectant an hemostatic effect.

A *sine-qua non* in the prophylaxis of septic diseases is the prevention of hemorrhage. This is aimed at by the use of the tampon, caustics, cautery, ligature, suture. Wherever possible we should endeavor to obtain union by first intention, and here is the indication for the suture. Only when necessary for checking hemorrhage should we use the ligature, the cautery, or the tampon associated with styptics.

The simpler the suture the less likely it is to irritate the united edges, and the better the adaptation the more likely primary union. The various complicated methods of suture formerly in vogue are rarely used now-a-days, but generally the surgeons' knot, or the running suture for quick adaptation. As to whether silk or wire be used varies according to the preference of the individual operator. It is of much more importance to include tissues of sufficient vitality in the sutures, and to obtain parallel and even adaptation. Generally deep sutures are inserted, and between them superficial. Ragged edges, blood clots, should be removed before tying the sutures. The sutures must not be tied too tightly, but sufficiently to prevent the interposition of blood or fluid between the edges. If after the introduction of the sutures there is hemorrhage, then a suture must be passed under the vessel or it must be tied.

The methods of controlling hemorrhage by means of the cautery and the tampon we will speak of later. After careful co-aptation, the surface should be wiped dry by means of absorbent cotton. In case there is oozing or pockets, then drainage should be resorted to, as is described under the various operations. After operations on the vagina or the cervix, the surfaces are best kept dry by sprinkling with iodoform and then tamponing with 50 per cent. iodoform gauze. Of course the tampons should not be pressed so tightly as to strain the sutures. In the same way salicylic acid, or bismuth, or thymol gauze may be used. The iodoform gauze may remain *in situ* at least forty-eight hours, or if there is no oozing from five to six days. After its removal, the surface is douched, and fresh gauze is inserted. In case of plastic operations, where rest of the parts is an essential matter, the dressing should not be removed, but the douche ordered in case of much secretion. In case the operation has been performed in the cavity of the uterus, then this is either tamponed with iodoform gauze, or else an iodoform pencil is inserted, which is renewed from time to time.

In general too active means interfere with the aseptic treatment. In the thoroughly disinfected vagina asepsis is obtained because of the shutting off of the air. Injections in cases which are pursuing a normal course do more harm than good, for mechanical injury may readily be done, the united edges may be separated by the point of the syringe, and, further, the use of much fluid may interfere with union by first intention.

Pure air, cleanliness, and rest, are the essential factors in the after-treatment. Special rules as regards rest in bed must be formulated for the individual case. Generous, but non-irritating diet enters also greatly as a factor in the after-treatment, and strong tea, coffee, spirits, etc., are to be strictly forbidden. In case of badly nourished anemic women, in particular after major operations, this rule is inoperative, and coffee, tea and rhum, wine, champagne, etc., must be ordered. Pain, which is frequently present for some time after operation, must be allayed by narcotics, subcutaneously, locally, or by the vagina or rectum. Small, frequently repeated, rectal injections of opium, are particularly to be recommended. This agent should not be used too sparingly, since sleep of some hours is of great benefit to the patient. In case of purely nervous patients, where pain is not a factor, chloral hydrate, and the bromides, etc., are indicated.

In case all of the detailed rules have been rigidly adhered to, it will be exceptional that convalescence is not undisturbed, and union by first intention does not result. As yet, however, it is not in our power to keep infection absolutely at a distance, and here and there we meet with septic affections. Owing to the site of many of our operations we are unable to detect local changes in the wound, as is possible with the general surgeon. In case of wounds of the uterus and vagina direct inspection after operation is generally not possible, and we have to depend on the sensations of the patient, and on the nature of the wound secretion.

The state of the temperature and of the pulse are of the highest importance. The thermometer should be used frequently and at regular intervals. In case of plastic operations, the slightest rise of temperature may mean interference with union by first intention. In regard to elevation of the temperature, we must take into account the nervous irritability of the patient, the influence of the dressing (iodoform), intercurrent affections, (such as catarrh of the bladder from infection by the catheter). In case these factors are eliminated, then an examination of the secretions may give us a hint as to the nature and site of the cause at the bottom of the fever.

Septic affections early manifest themselves by disturbance of the subjective state of the patient. Listlessness, loss of appetite, restlessness, alteration of the facies, etc., tell the careful observer of impending infection. The determination of these factors necessitates, of course, thorough knowledge of the patient, and where such is not the case, careful inquiry into her antecedents may assist us.

Serious septic infection is readily recognized, but we must always bear in mind the possibility of the symptoms being due to the development of one of the exanthemata, such as typhoid. The appearance of the wound, and thorough examination of the secretions, will assist us in differentiation.

In case in this way the presence of infectious matter is determined, then our first aim should be to provide for as free removal of the secretion as is possible. Tampons, clots, portions of tissue, sutures which are involved in necrosing tissue, these should be at once removed; the uterine cavity, in which there is frequently a flexion, may be cleansed and emptied by injections.

The second indication is the removal of the necrosed masses, to prevent renewed absorption. Injections of disinfecting fluids will not accomplish this, but the masses must be removed with cotton or instruments, under the guidance of the eye, of course, to prevent new injury whence fresh absorption might take place, and the more readily since we might open occluded lymph vessels or veins as well as interfere with the protective granulations. It is far preferable, hence, to thoroughly cauterize these masses down to sound tissue, although in case of wounds in gynecology this is not always possible. In case we can readily expose the diseased parts, then we may apply one or another of the caustic agents to be described further on.

For the purpose of disinfecting the uterine cavity, the best measure is repeated or permanent irrigation. We have already spoken of the disinfectants which may be used. At the time, however, we were speaking of asepsis, and now we aim at obtaining the antiseptic action, and therefore we use concentrated solutions. We expect our disinfectant to be absorbed, and to work deeply so as to take the place of a caustic. We thus use carbolic (5 per cent.), chlorine water, chloride of zinc (1 per cent), sublimate (1 to 2 per cent.), remembering the risk of toxic effects. I much prefer chlorine water and zinc chloride. The burning resulting from such caustic agents is best prevented, as is my custom, by simultaneously douching the vagina with water. The external parts are protected by smearing with vaseline or glycerine. The technique of the intra-uterine douche, and of the permanent vaginal and uterine irrigation will be spoken of in the next chapter.

Obviously, internal medication must also be instituted. Quinine, salicylate of soda, antipyrin, arsenic, ergotin to keep the uterus in a tonic state of contraction and thus to prevent absorption, alcohol and other stimulants, such are the means at our disposal.

Although all of the measures we have referred to require much time and patience for their application, and may in general only be stringently enforced in a hospital, it is still our duty to bear in mind the possibility of the occurrence of virulent infection even after the most simple manipulation, such as an examination necessitates, and all our methods should be clothed in asepticism.

In the physician's office asepsis is so much the more difficult to obtain the greater the number of patients, and the more quickly they must be disposed of. This is one reason why women suffering from chronic affections, in particular the catarrhal, should not be referred to the specialist, who is unable to pay attention to minutiæ. In a previous chapter we have stated that many manipulations must of necessity be performed by the specialist, and the large proportion of diagnoses must be made by him, but the treatment of many affections must in the interest of the laity and of the profession lie with the general practitioner and not with the specialist.

Since in one's office it is impossible to attend to the disinfection of the patient, we must limit ourselves to the cleansing of the parts to be examined by cotton dipped in carbolic, etc., and in case of much leucorrhea to injections of 1 to 2 per cent. carbolic solutions.

Before each examination the physician should wash his hands in soap and water, using a nail brush, and then dip them in 5 per cent. carbolic or 1 to 1000 sublimate. The sleeves should be rolled up, as also the clothing of the patient. The instruments should be disinfected before use in 5 per cent. carbolic, which solution should be ready in every office. In case of a large clientèle it is of advantage to possess a number of instruments of the same kind, in particular specula and sounds, in order to save the time requisite for frequent washing.

CHAPTER XVIII.

THE APPLICATION OF FLUIDS TO THE VAGINA AND UTERUS.

I. The Injection of Fluids.

a. Vaginal Injections.

IN Hippocrates' time vaginal injections were frequently resorted to, such as infusions of herbs, fat, honey, and metallic solutions. Galenus, Eucharius Röslin, Nicolaus Roccheus, Avicenna, and many others, referred to these injections as uterine, although it is most likely they were only vaginal, since with but few exceptions, up to the time of Fallopius, no distinction was made between the vagina and the uterus. The douche, as used to-day, was employed in 1450 by Christian Barzizius, and in 1530 by Conrad Gessner. In 1813 Sèdillot first described the douche, and in 1825 Dupuy constructed a complicated douche apparatus. From this time forth numbers have been devised—for instance, those of Beigel, Blot, C. Braun, Breit, Busch, Bürkner, Davanceaux, Depaul, Graily Hewitt, Kiwisch, etc., etc., apparatuses which, with few exceptions, are only of historical interest, and are generally replaced by Hegar's tube, and Esmarch's irrigation can. Although we describe a number of the above forms, it is only because they are still made and bought, and the physician is sometimes obliged to use them.

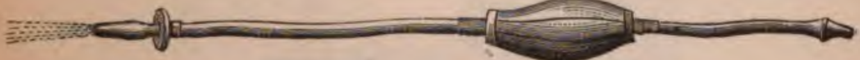


Fig. 70.—Soft Rubber Syringe. (*Hegar and Kaltenbach.*)

The ordinary injection tube, generally constructed of tin, is a good instrument. The rubber hand-syringe is a popular instrument, and on account of its cheapness and small size it is to be recommended, although the stream which it yields is intermittent. Care must be taken to empty it of air before use, and the liability of injecting air is the one great objection to this instrument and to others constructed after a similar pattern. The Eguisier irrigator, and the douche apparatus of Beigel, as also the Scanzoni-Richter, are frequently used.

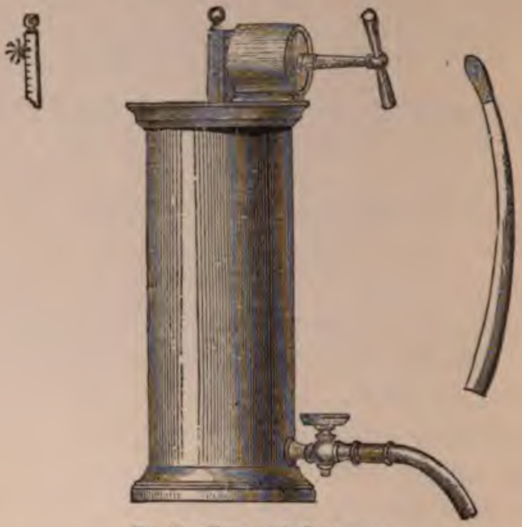


FIG. 71.—EGUISIER'S IRRIGATOR.

The most convenient injection apparatus, however, is the ordinary irrigator. (Fig. 74.) It holds from two to four quarts of fluid, and is suspended from any object above the patient, and by means of it a constant current is obtainable, the force of which may be regulated.

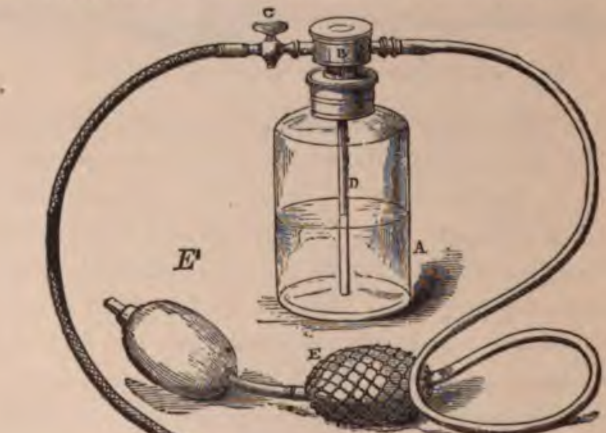


FIG. 72.—BEIGEL'S APPARATUS.

Under the name vaginal irrigator Kisch has devised an instrument, shaped like Arzberger's rectal cooler, which provides for the return stream. The instrument should properly be called a vaginal-cooler, and

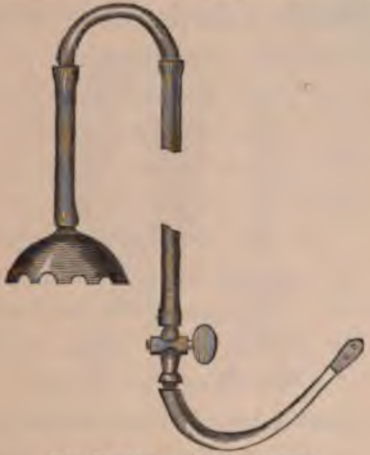


FIG. 73.—SCANZONI'S APPARATUS.

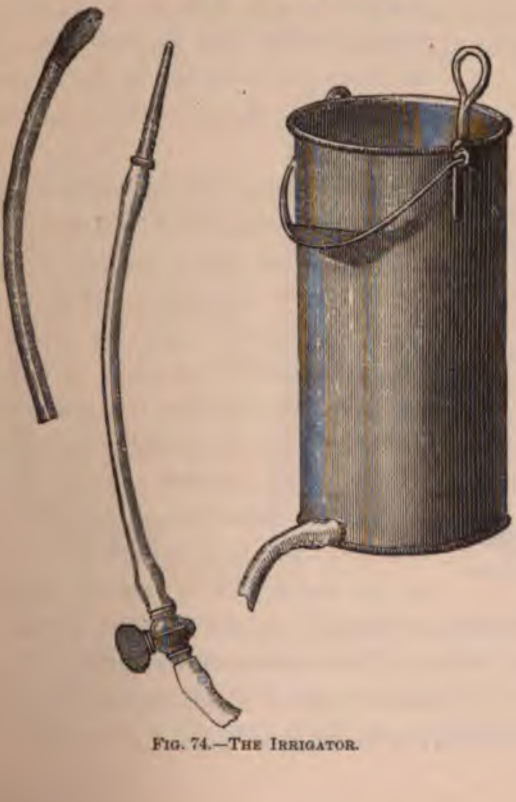


FIG. 74.—THE IRRIGATOR.

is useful for the topical application of cold. It cannot, however, be used continuously on account of the pain it causes at the introitus. For the purpose of refrigeration or calorification Heitzmann's regulators are preferable. They consist of smooth, cylindrical, metal capsules for the vagina, and of metal tubes for the uterus, through which water at the desired temperature is allowed to flow, the outflow pipe leading to a vessel under the bed, and the inflow being connected with an irrigator.

[In this country the Davidson, or the Alpha syringe—the latter furnishes a continuous stream—takes the place of all complicated apparatus where the desired object is the injection into the vagina of a limited amount of fluid. Where it is desired to use a large quantity of water, or to obtain the well-known effects of heat, the ordinary fountain syringe, or a douche can, such as is figured in Vol. IV. of this *Cyclopedia*, is to be preferred. The comfort of the patient is subserved by the possession of one or another of the forms of self-discharging bed-pans.—Ed.]

Accompanying each apparatus is an injection tube, constructed ordinarily of hard rubber or of porcelain, although I use almost entirely straight glass tubes with rounded extremities. (Fig. 77 c.) The possibility of injection into the uterus by means of these tubes should be borne in mind by the physician and impressed on the patient. Each patient should have her special tube, and after use it should be thoroughly cleansed and disinfected. The majority of the tubes have a central perforation. It is better to close this or to use a tube without the central os, seeing that in case of patulous cervix the stream might be thrown directly into the cavity of the uterus and set up uterine colic. To avoid this occurrence Braun (Fig. 77 a.), and Kocks (Fig. 77 b.), have devised tubes in which the stream of fluid is broken and deviated towards the lateral openings.

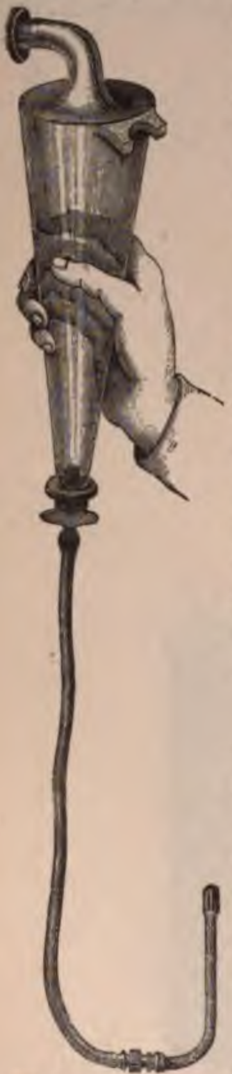


Fig. 75.—Leiter's Irrigator.

The patient must be instructed as to the depth to which the tube should be inserted into the vagina, else she may introduce its entire length into the canal and do herself harm. It is advantageous to place a rubber ring around the tube to mark the depth to which it should be inserted.

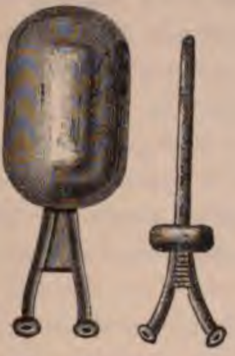


FIG. 76.—HEITZMANN-LEITER VAGINAL AND UTERINE REGULATORS.

That the injected stream may be thrown directly into the uterus the following case, which I observed, proves: I advised a patient, who frequently suffered from uterine colic after vaginal injections, to close the central aperture of her injection tube. She used a piece of a match for this purpose. A few weeks thereafter she was seized with parenchymatous metritis and parametritis and convalesced only after the lapse of some months. A few days after the onset of the affection I detected a

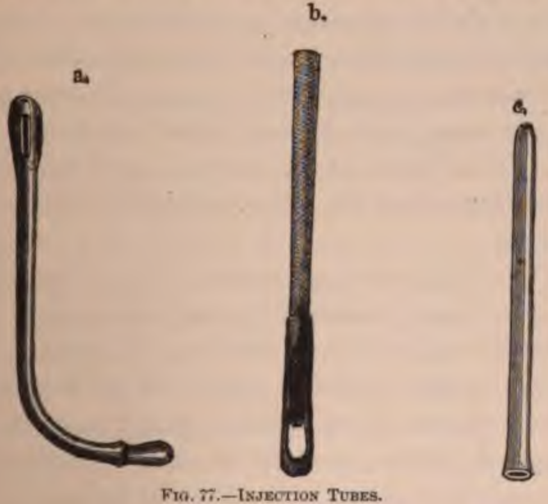


FIG. 77.—INJECTION TUBES.

foreign body in the uterus, which on removal proved to be the match. The stream from the douche had dislodged it from the extremity of the tube and had thrown it into the uterus, where it had set up the inflammatory affection.

Vaginal injections are generally taken by the patient sitting astride of vessel into which the water may flow. Often they are taken while the patient is in a bath-tub. As Ricord has stated, however, thorough douching of the vagina is only possible when the woman assumes the dorsal position, and this position is essential when the hot douche is taken. The pelvis of the patient must be elevated and a bed-pan slipped under her. Since thus the intra-abdominal pressure is lessened or even negatived, only a feeble injection stream is needed in order to balloon out the vagina. Free outflow may be secured by the insertion of a second tube in the vagina, or else by using a double canula.

In general the aim of vaginal injections is to cleanse this canal. Since the patients usually take such injections themselves, it is necessary to give them an apparatus which is readily used and not complicated. The reservoir should hold at least one quart of water, and the stream should be free, constant, and without admixture with air. Although the danger from entrance of air into the genital passages has been exaggerated, still when it occurs it may be accompanied by infection, or unpleasant reaction. When cleansing is simply aimed at, plain luke-warm water, or with the addition of permanganate of potass, carbolic, sublimate, and the like, may be used. These injections are, however, also of use therapeutically, either to affect the cervix or the vagina medicinally, or else to obtain the effect of heat.

The fluid injected into the vagina remains only a short time in contact with its walls, and it only occasionally penetrates into the cervical canal. The fluid may be medicated in various ways. The common mistake is to use solutions of too great strength. Seeing that the fluid escapes by the sensitive introitus vaginæ, strong astringent solutions cannot be used. In general, phlegmatic women stand stronger medicaments than the more sensitive, although there are many exceptions to this rule.

Of astringents utilized we may mention alum, zinc, nitrate of silver, copper, sesqui-chloride of iron, permanganate of potass, tannin, and infusions of various kinds containing it, etc.

At the outset alum should be used only in 2 to 1000 solution; lead, zinc, copper, silver, in 1 to 1000; tannin 1 to 3 to 100. It is well to alternate in astringents. They are to be dissolved in warm water, and the vagina should, when possible, be washed out with plain water before the astringent is used.

Less frequently than astringents, demulcent and narcotic agents are used, such as warm milk, and various decoctions to which may be added opium, belladonna, salt, etc. Cataplasms and ointments were used by Astruc, Lair, and others, but at the present day such agents are only resorted to in cases of incurable disease, where it is necessary for palliative purposes to constantly change the remedy. Disinfectant injections are frequently used for cleansing purposes, such as solutions of permanganate of potass, carbolic and salicylic acids, thymol, soda, acetic acid, chlorine water, etc.

The irritating effect of forcible vaginal injections was utilized by Kiwisch for the purpose of inducing labor. In gynecology this is rarely necessary and may be injurious; it is resorted to, indeed, only where it is desired to stimulate the uterus.

Thermal effects are frequently aimed at. Cold water, although still frequently ordered, unquestionably may do more harm than good. In general the patient should be directed to use water at a pleasant temperature, beginning with lukewarm water and increasing the heat until the desired degree has been obtained. Cold injections are only indicated in case of atony of the uterine structure, in hemorrhage and catarrh due to this cause, in torpid, little sensitive individuals, in case of readily bleeding erosions, ulcerations and new-growths, in displacement and in distortion of the uterus, which depend on lack of tone in the organ or its ligaments, in subcutaneous inflammatory and congestive affections where they cause hyperesthesia. The colder the water the less forcible should be the stream, and the greater is the risk of damage.

The use of the warm and of the hot douche, although its purpose was predicated and it was strongly endorsed by Kiwisch, was earlier still advocated by Sédillot, and later by Trousseau, Scanzoni, and others. Its present wide popularity, however, must be traced to American influence. Kiwisch formulated the indications as being atonic amenorrhea, vicarious menstruation, chronic "induration" of the uterus, neuralgic dysmenorrhea, and in the writings of Benicke, Bertraun, G. Braun, Chadwick, Emmet, Kurz, Landau, Nöeggerath, Peter, Richter, Rokitansky, Runge, Schenck, Simpson, Windelband, and others, it is endorsed in case of extra- and intra-peritoneal exudations, hemorrhages, in particular the puerperal and those associated with fibromas of the uterus. In case of inflammatory affections of the ovaries, hot injections ordinarily increase the pain.

At the outset we must carefully utilize the douche at a temperature which is pleasant to the patient, remembering that phlegmatic women bear higher temperatures than those of the reverse constitution. Where our aim is to cause absorption and softening of indurations, I know of no agent which will yield such good results. Higher temperatures (116°) have been advocated by Emmet in case of hemorrhage, and the uterine cavity itself may be similarly douched.

The hemostatic effect of hot water has, however, been exaggerated, and it has been claimed as valuable under all circumstances. This is erroneous, for it seems that after the use of hot water relaxation of the tissues surrounding the uterus, and of the organ itself, is more likely to occur than after the use of cold water. Nevertheless, hot injections, aside from the puerperal state, have often rendered me good service in case of hemorrhage, and it is particularly noticeable that they are less objectionable to anemic and nervous patients than are cold.

To administer these injections, a receiver holding from two to four quarts is needed, which yields a steady stream, and the patient must assume the dorsal position with the pelvis slightly elevated. We may add carbolic, or permanganate of potass, or, in case of hemorrhage, iron, to the solution which is to be injected. After the injection has been administered the patient should remain on her back for a while.

In the use of vaginal injections it is to be noted that the effects are variable according to the force of the stream, the elevation of the temperature, the concentration of the solution, and the quality and quantity of the agent which is added to the injected fluid. Aside from the untoward effects of entrance of the solution into the uterus, injections should be used with great care in acute inflammatory processes in the genitals, particularly of the ovaries, bladder and rectum. Intense pain in the pelvis, uterine colic, a feeling of oppression, increase in the inflammatory process, hemorrhages, general congestion, loss of consciousness, meteorism, profuse perspiration, such are often noted sequelæ. Many women insert the tube too far into the vagina and do damage, particularly where readily bleeding neoplasms are present. It is therefore advisable to order injections only in the face of strict indications, and to give patients such apparatuses with which they are not likely to injure themselves. Instances where the sequelæ have been untoward were not those in which an irrigator or similar apparatus was used. Even fatal cases have been recorded by Ebell, Spaeth, Thomas, and others, the result, likely enough, of the entrance of air and of different solutions into the uterine veins.

b. Intra-Uterine Injections.

Lisfranc and Vidal de Casis are the first who resorted, in a routine way, to the injection of fluids into the uterus. From Cohnstein's historical sketch it is apparent that injections of this nature were used long before the time of these authorities, and Lisfranc states that Vignerie first used them at the end of the 17th century. It would appear, however, that the solution was not injected into the uterus. It is only in the last forty years that the procedure has gained ground, although still there are many gynecologists who refuse to resort to it, in view of the possible untoward sequelæ.

Just at the time when intra-uterine injections were beginning to be generally administered, Hourmann recorded a case where they were followed by intense peritonitis; Bretonneau two deaths. Since then the like cases are frequent enough, Astros, Barnes, Bessems, Gubian, Haselberg, Heywood Smith, Kern, Kormann, Fanchon, Weber, and others, having recorded each one fatal case, and Becquerel, Hegar and Kaltenbach, each two instances, and the cases where the injections have been followed by alarming symptoms—generally peritonitis—are numerous. In many of these cases it is evident that faulty instruments were used, or else that there was neglect of the necessary precautions, and the vast majority of gynecologists are of the opinion that the injections are not dangerous, if they are resorted to under strict indication and with sufficient care.

In connection with such sequelæ we must take into account the fact as to whether the aim of the injection is to leave one or another drug in contact with the endometrium, in which event but little fluid should be used, or where the object is to cleanse the uterine cavity, in which case a quart or more of fluid should be used. The first aim may be better fulfilled, and without risk, by methods we will shortly refer to; the second cannot be attained in any other way.

Various agents have been used for medicating the uterine cavity. Bennet, G. Braun, Breslau, Boissarie, Gantillon, Männel, Routh, Sigmund, advocate iron salts; Hildebrandt, Murray, Noeggerath, Ricord, Routh, Savage, Spiegelberg, Steinberger, Tilt, the tincture of iodine; Vidal, Sigmund, a solution of iodide of potass; Freund, iodide of lead and of potass; Martin, Sigmund, sulphate of copper and alum; Fürst, Rècamier, Retzius, Steinberger, Sigmund, solutions of nitrate of silver; Guillemin, sulphate of zinc; Evory Kennedy, nitrate of mercury; Fürst, Sims, glycerin; Filhos, M. Duncan, plain water; others, salts of lead, alum, tannin, carbolic acid, etc. One or another of these agents may be used, and the risk does not depend on the kind of agent, but on the strength and the manner of insertion.

The chief risk from intra-uterine injections is peritonitis. In Haselberg's and Kern's cases, and in one of Hegar and Kaltenbach's, it was determined *post-mortem* that the iron solution had been forced through the tube; Astros found the injected fluid in a vein of the broad ligament; Bessems found air in the vena cava, although this case, like Barnes's, was that of a puerpera. In Haselberg's and in Kormann's case, as Goldschmidt has pointed out, it is probable that the fatal result was rather due to accumulation of pus or purulent fluid in the tubes than to the passage of the fluid through them.

Vidal de Casis, Hennig, Olioli, Klemm, Rokitansky, and others, have made experiments on cadavers to determine the possibility of the passage of fluid through the tubes, and they reached the same conclusion that by taking the necessary precautions no fluid enters the tubes unless the cervix closes around the canula, and much fluid is injected (over ℥ j. Vidal) and with considerable force. The results, however, are not entirely applicable to the living, seeing that in them the contraction of the circular muscular fibres around the ostia tubarum guards against entrance of fluid, this contraction being caused by the stimulation of the uterine mucous membrane; but then, on the other hand, there are instances where the opening of the tubes are patent and here the entrance of fluid is favored (Bischoff). It should be noted, however, as is emphasized by Hegar and Kaltenbach, that there has been no fatal case recorded where all the requisite precautions, to be noted further on, were attended to.

Aside from the affections which result from the entrance of fluid into the tubes, and which are now of infrequent occurrence, we often see more or less severe inflammatory affections of the uterus, the cellular tissue and the peritoneum, uterine colic, nervous disturbances, collapse, fainting, spasms, and the like. These occurrences are to be laid to the irritation caused by the injection, and very frequently, as Schwartz has surmised, to infection from the cervical or the vaginal secretion. Although in general it may be stated that an hyperesthetic hysterical woman will react far more from a given irritation than a woman of the opposite constitution, this rule has many exceptions, and we may witness in phlegmatic women uterine colic, and not at all in anemic, hysterical women. It is wise to determine beforehand the tolerance of the genital canal to irritant causes. The bimanual examination will suffice to determine this irritability, and it is not necessary, as is recommended by Rehme and others, to test it by means of the sound. The presence of recent and old inflammatory affections in the uterus or its surroundings, will generally cause reaction against uterine injections.

The irritation caused by injections is either chemical, thermic or mechanical, and depends on the caustic or astringent effect of the fluid used, or on the degree of temperature, the force of the current, the amount of fluid which distends the uterine cavity.

The presence of large or small coagula in the cavity will cause the uterus to contract energetically, in order to free itself from its contents, and these contractions will be the more intense the greater the difficulty in expulsion; and, furthermore, large coagula prevent the outflow of the injected fluid, and the danger of its entrance into the tubes is heightened. Under mechanical irritation belongs, of course, damage to the endometrium by the point of the syringe.

From these considerations in regard to the etiological factors, the rules for and the contra-indications to injections into the uterus may be formulated as follows: 1. The cavity of the uterus must be wide enough that the walls be not distended by the injected fluid, and at times, hence, only a small quantity of fluid should be used, and its ready outflow must be assured. The capacity of the uterine cavity should be determined by means of the sound, and thus we may estimate the amount of fluid which should be injected. In order to assure the outflow, Freund, Hennig, Gallard, Avrard, who are accustomed to use quarts of water, have devised double canulæ. By employing these the danger of stasis in the uterus is lessened, but not entirely done away with, since the openings in the canula may become occluded by clots. The safest plan, according to Spiegelberg, is to dilate the cervical canal before injection, except where it is large enough already to allow the exit of even large clots by the side of the canula. Hildebrandt claims that this precedent dilatation is unnecessary in case after the injection the entire quantity of fluid can pass out of the uterine cavity. We must be specially careful in injecting in cases where uterine flexions exist or new growths in the wall of the organ.

The fluid should only be injected slowly, drop by drop. The temperature of the fluid should be that of the body, certainly at the outset, when we have not ascertained the irritability of the uterus.

Injections should not be administered in the presence of recent inflammatory processes in the uterus and its surroundings. Remnants of exudation are not absolute contra-indications, although they call for extra care.

In case there are new growths of the uterine mucous membrane, owing to the possibility of there being present as well patent blood-vessels, these growths (vegetations) should be removed before resorting to injections. We must always take care not to inject air, and it goes without saying that pregnancy must be excluded; many indeed do not administer injections shortly before or after the menstrual period, although solutions of iron have been injected during menstruation without bad effect.

Since, in regard to the occurrence of uterine colic, it is important to know what agents produce large and hard coagula, J. C. Nott and I experimented with various astringents and caustics. The persulphate and chloride of iron, alum, carbolic, tincture of iodine, permanganate of potass, zinc solutions, were tested on solutions of albumin, and it can be stated that iodine, zinc-oxide, permanganate of potass, and alum, produce scarcely any firm coagula, and that carbolic precipitates the albumin in powder form. The addition of glycerin produced no coagulum, and the mixture of glycerin and liquor ferri, and with nitrate of silver solution, diminished greatly the formation of coagula, while a tannin-glycerin mixture caused large coagula.

For the purpose of injecting fluids into the uterine cavity, various and frequently objectionable instruments have been used. C. Braun, Sims, Freund, Hoffmann, Vorstädter, and others, have invented, however, very serviceable instruments, of which number the Braun-Madurowicz's instrument is most in favor. The cylinder of the instrument holds twenty drops of water, and the extremity is curved like the uterine sound, being constructed of hard rubber. The extremity of the instrument is fitted with a movable cap which may be rotated so that the stream may be directed in any desired direction. It is of advantage to have the glass cylinder near the outer extremity of the instrument, for thus the working of the piston, may be noted by the eye. The Hoffmann syringe is constructed like the Braun's, except that the fluid, instead of being injected directly into the uterus, is deposited on a piece of absorbent cotton, which is wrapped around the extremity of the canula, and thus the agent is brought indirectly in contact with the uterine mucous membrane.

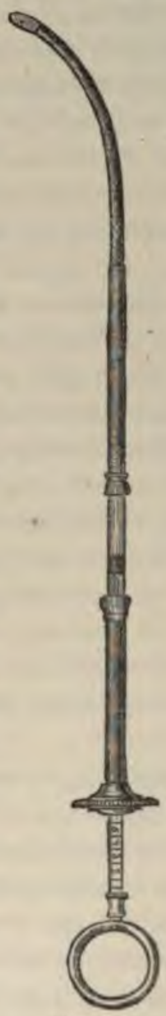


FIG. 78.
BRAUN'S SYRINGE.

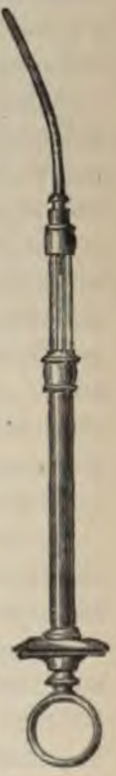


FIG. 79.
HOFFMANN'S SYRINGE.

To inject the uterus the patient should occupy the dorsal or elevated dorsal position; the lateral may be used, although care should be taken that the intra-abdominal pressure be positive; the cervix is exposed by a speculum and fixed by a tenaculum. The discharges are wiped off with cotton, the cervix is surrounded by it to receive the discharged fluid, the syringe, filled with the warmed fluid is inserted, care being taken that it contain no air. The cervical canal, where necessary, should first have been dilated, and the uterine cavity have been thoroughly irrigated after the manner to be mentioned further on. The piston is very slowly pushed home, the fluid being discharged drop by drop into the uterine cavity. During the procedure there should be a free outlet by the side of the syringe, otherwise the injection should at once be checked. Where the fluid remains in the uterine cavity, it is to be sucked out by reversing the action of the syringe. It goes without saying that the point of the canula must be inserted above the internal os.

The injection may be administered through a cylindrical speculum, or without using any instrument whatsoever, the canula being guided into the uterus along the finger. But thus, aside from the danger of infection by cervical or vaginal discharge, it is impossible to watch the outflow of the fluid, and we are unable to guard against its action on the vagina. In case it is impossible to insert a speculum, or in case we are unable to expose the cervix, as may happen where the uterus is much displaced by a fibroid, then the vaginal walls may be protected by irrigating the canal during the administration of the injection.

When the process is at an end, the patient should remain quiet for awhile, and it is a good plan not to inject dispensary patients until we have determined the tolerance of the uterus.

The indications for injection of the uterus are, in general, the presence of a chronic catarrh of and hemorrhage from the body of the uterus, which do not yield to other measures, and here astringents and styptics are useful; further, the presence of vegetations, polypoid or fungous growths or remnants in the endometrium; further still, and most important of all, the necessity of disinfection of the uterine cavity or of its contents, frequently associated with the removal of such contents (coagula, portions of new growths, etc.). Very seldom is the injection of narcotics called for.

At the beginning, in order to test the tolerance of the organ, either lukewarm water, or a weak solution of the requisite medicament, is to be used, and afterwards concentrated solutions, which are always requisite where we aim at cauterization (bromine, tincture of iodine, Lugol's solution, nitric acid, liquor ferri sesquichlorati, etc.). G. Braun has advocated the use of a neutral solution of the sesquichloride of iron, in order to diminish its irritant properties.

In order to cleanse the uterine cavity of mucus, which is in the way of the direct action of the medicinal agent, it may be washed out with weak alkaline solutions or else removed by a cotton stick, etc.

The Braun's syringe may also be utilized for the procedure of artificial impregnation.

Aside from the purpose of medicating the uterine cavity, injections are also resorted to for cleansing and disinfecting it, and such irrigation is also useful in case of chronic endometritis. The indications for disinfecting irrigation of the uterus have already been referred to. It remains only to speak of certain points in regard to the technique.

A pre-requisite to the use of these injections is the securing of a free outlet for the fluid. In case the cervical canal is wide enough open to permit the passage of coagula, etc., by the side of the tube, then any open tube, such as the glass vaginal or a catheter, may be used. Such patency, however, is rarely met with, and generally it must be obtained by means of tents or dilators. In case the requisite patency is not obtainable, then we must use double current tubes.

Schultze, Fritsch, Schröder, Freund, Toporski, and others, have devised catheters, some of which act on the principle of Cloquet's double current, and others are like Bozeman's. I use, ordinarily, one of three forms: A straight or slightly curved glass or metal tube, with a terminal opening, a double current catheter, and by preference Fritsch's modified Bozeman's catheter. This latter consists of an injection tube with a guard at its upper third, a large oval window at its lower extremity, a longitudinal lateral slit at its upper portion. By means of this catheter, the outflow of coagula, etc., is secured, not by its side, but through the openings in it, which are in the uterine cavity.

Four years ago I modified the Fritsch-Bozeman instrument by making the guard conical (Fig. 81, *a*), and I now use this instrument not only for injections, but also for dilating where this is not requisite to any great extent. The process is analogous to the use of conical dilators, with the difference that during dilatation with the catheter the uterine cavity is being irrigated. The instrument has an S-curve, and this facilitates its introduction. A number of these catheters of varying dimensions and curvatures are requisite. The catheter is connected with the reservoir by means of rubber tubing, and the tubing should be furnished with a clamp so that the stream may be checked at any minute.

For disinfectant irrigation, water, at the temperature of the body, and with the addition of carbolic, sublimate, or any other disinfecting agent, should be used. We may allow any amount of fluid to pass through the uterine cavity, but the force of the current must be regulated and the proper temperature maintained.

To administer the injections the cervix is exposed by means of a Cusco

or a tubular speculum. The dorsal position is to be preferred, si
thus the fluid will discharge to better advantage. The nates are elev
on a bed-pan. Welponer has had triangular bed-pans constructed.
cervix is steadied by a tenaculum, wiped off with cotton, and the cath
filled with water is inserted into the uterine cavity, after precedent d

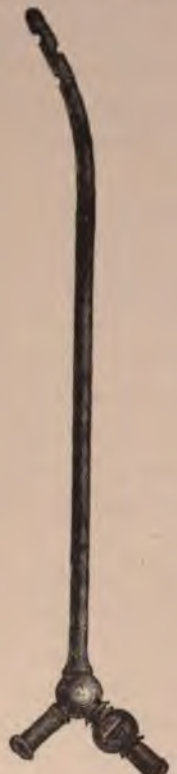


FIG. 80.—DOUBLE CURRENT CATHETER.

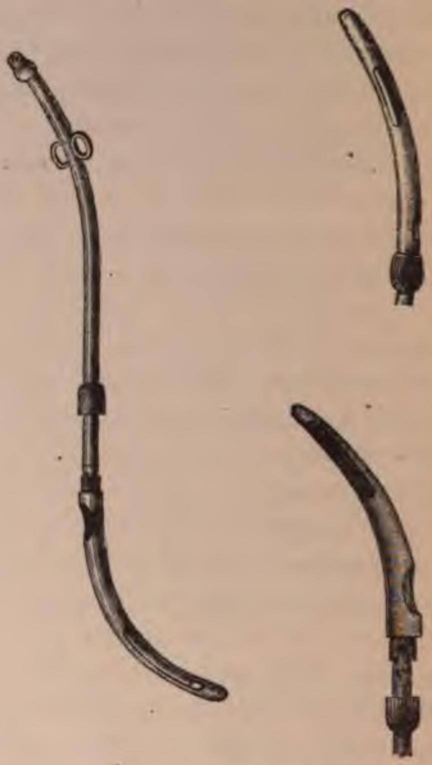


FIG. 81.—FRITSCH-BOZEMAN CATHETER.

tation in case this is requisite. In case the catheter becomes occlude
must be removed and cleansed.

When the requisite precautions have been taken, I have never
nessed any marked reaction; occasionally there is slight colic, or sli
hemorrhage, but I have never seen the untoward sequelæ which we h
spoken of as possible following the injection of medicinal agents.
it is necessary to resort to such disinfecting irrigation with great c
and with attention to the essential rules.

c. Permanent Irrigation.

Although repeated irrigation of the uterine cavity is an excellent antiseptic measure, still by means of it we cannot obtain lasting disinfection. It is further inconvenient to irrigate frequently, since it must be done by the physician, and the patient's rest is further disturbed. In all cases where the nature of the secretion, the temperature curve, etc., point to the fact that asepticism has not been obtained, notwithstanding repeated irrigation, permanent irrigation should be resorted to. Although the indications for this procedure will usually be met with in obstetrical practice, cases are often enough seen in gynecological practice, such as septic wounds after operations, in particular partial enucleations of tumors from the uterus and vagina, and here as well constant disinfection is desirable.

For the prevention of septic infection, Billroth, Mikulicz, and others, after total extirpation of the carcinomatous uterus, have resorted to permanent irrigation, as also Holzer, and others, in case of chronic catarrh; but ordinarily the protracted hot douche is used to cause absorption of parametric exudations.

For the purpose of permanent irrigation, the patient should lie on a self-discharging bed-pan, and those parts of her body which come in contact with the fluid should be smeared with vaseline or glycerine. Many useful apparatuses have been devised in order to enable us to irrigate permanently with the least possible annoyance to the patient.

Irrigation of the vagina with the least possible wetting of the patient is possible by the use of a Holzer or Mikulicz's speculum, which is very similar to the Bodenhamer. The Holzer speculum consists of a hard rubber cylinder fitted with two tubes, the one for inlet and the other for outlet. I have used a rubber bladder for closing the vulva. It is like the Trendelenburg canula, only it is fitted with a third tube for the purpose of inflating the bladder. My apparatus (Fig. 83) is self-retaining, while Holzer's must be kept in place by a T-bandage. By means of such apparatuses the patients are able to move somewhat without becoming wet through, but being difficult to cleanse they are themselves likely to be causes of infection.

It is preferable to resort to irrigation after Küstner's method. His apparatus consists in a reservoir from which extends a rubber tube, at the extremity of which is the glass vaginal canula. This canula has a number of openings in the portion which is inserted into the vagina. The patient occupies the dorsal position, with negative or diminished intra-abdominal pressure, the nates being elevated, the vulvar cleft looking upwards, and thus the entire vagina may be filled with water. Under these conditions a very weak stream, drop by drop even, suffices for the irrigation. It is often unnecessary to have a constant stream. According to Schultze, with the patient in the above position, it is sufficient to renew the fluid in the vagina every few hours.

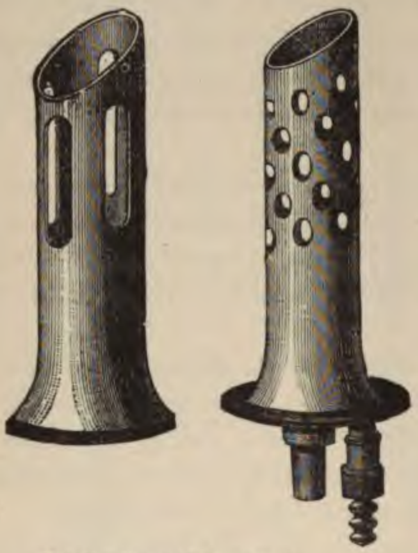


FIG. 82.—HOLZER'S APPARATUS.

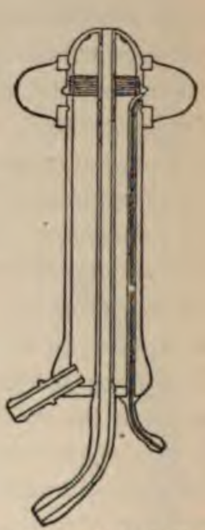


FIG. 83.—CHROBAK'S APPARATUS.

Permanent irrigation of the uterine cavity may be secured by means of Fritsch's hydrostatic disinfection apparatus. Schücking has favored permanent irrigation, and with certain modifications his apparatus is a good one. It consists of a reservoir, rubber delivery tube, and a canula through which the fluid may discharge drop by drop. For purposes of irrigation, the disinfecting agents which we have mentioned may be used, the fluid being kept at the temperature of the body. The tube may be left *in situ* for days, being occasionally removed for cleansing. Only where there exists flexion is it advisable to use a rigid tube, and then a short, thick-walled, rounded glass tube is to be preferred.

Permanent irrigation, although based on correct principles, is not generally used, and the impression should not exist that it is always an agent for good. Aside from the disadvantage of the protracted stay of a foreign body in the uterine cavity, whence uterine contractions may be excited; aside further from the possibility of absorption of the fluid (carbolic acid poisoning, etc.), and the untoward sequelæ of entrance of fluid into the veins and tubes, we should further remember that the disinfecting fluid may not come in contact with every portion of the uterine cavity, for a similar condition exists as in case of irrigation of the bladder by the double current catheter. Around the opening in the tube a cavity forms, and large portions of the mucous membrane lie close together and will not be reached by the fluid, and such is the case during irrigation of the cavity of any muscular organ. In case of irrigation of the vagina, it is possible, by utilizing the negative intra-abdominal pressure, for the fluid to bathe the entire canal even when the stream is weak. In the uterus, however, the conditions are far less favorable. Of this any one may convince himself by placing carmine, for instance, in the uterus or the vagina. Even after repeated profuse irrigation the fluid will return

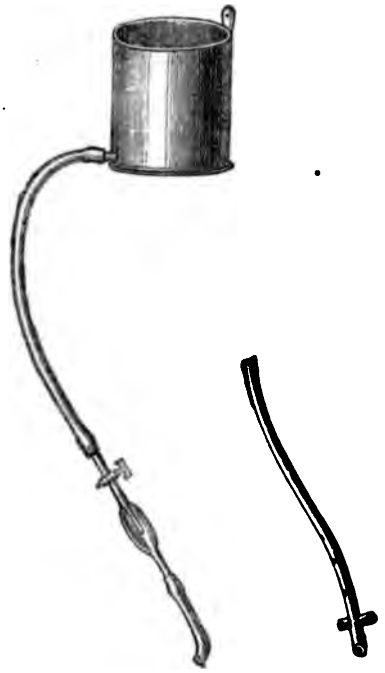


FIG. 84.—FRITSCH'S APPARATUS.

colored. I have often thus experimented with the normal uterus, and i is apparent that the conditions for disinfection are far greater in th cases where it is called for, owing to the many folds, creases, and angle which exist in the mucous membrane.

In case we take measures to lessen the intra-abdominal pressure, the the further difficulty arises that shreds and portions of tissue sink to th most dependent parts, and it is hence necessary to increase the force o the stream occasionally in order to thoroughly wash out the residual fluid and its contents.

Notwithstanding these considerations it is nevertheless true that permanent irrigation is a most valuable measure for obtaining the stringent disinfection of the genitals which is to-day deemed requisite.

In case we aim at simple drainage of the uterus, then we may use the rubber tubing with retention cross-bars, or preferably still glass tubes provided with numerous openings. In order to retain the drain in the uterus and to disinfect the discharges, the vaginal portion of the drain tube should be surrounded by carbolized, thymolized or iodoformized gauze.

Good results have been obtained by Ahlfeld and Schwarz from drainage of the uterus in case of chronic catarrh, mechanical dysmenorrhea, and amenorrhea. Ahlfeld uses for this purpose the perforated intrauterine stem which he devised, and Schwarz used rubber drains, and later, at Olshausen's suggestion, small glass tubes, in thin bundles, about two and a half inches long, and tied together at their uterine extremity, to guard against slipping. The bundle is powdered thoroughly with iodoform and carried into the uterus on the sound, or by means of a slender forceps. The outer extremity carries a string for the purpose of facilitating removal.

II. The Local Bath.

When a woman sits in a sitz-bath or tub, the water only cleanses the external genitals or penetrates a trifle into the introitus vaginæ. In order to keep the water for some time in contact with the vaginal walls and the cervix, a number of so-called bath speculums (Fig. 85) have been devised by Mélier, Raciborsky, Spengler, Tiemann and others, on the principle of keeping the vaginal walls apart. The multivalve specula with slender blades or the wire speculum which we have described also suffices for this purpose, as also the speculum "grillagé" (grated) of Gallard. The bath speculum generally used is conical in shape, its walls being perforated at many points. Tiemann's speculum is preferable in that it does not cover much of the vaginal walls, although it is not as readily inserted and removed.

The use of such specula is very limited. They are used particularly in many "cure" establishments for the purpose of keeping medicaments in long contact with the vagina in the hope of absorption. In case of many fluids the speculum does not suffice, and furthermore, as Cohnstein says, the propriety is questionable of placing in the hands of women instruments which are very capable of exciting the sexual appetite.

Strong applications, which on this account cannot be administered by bath or injections, are best applied through a tubular speculum. By this means, first advocated by C. Mayer, we are able to use the stronger astringents and caustics, and we are able further to limit their action as may be desired. The patient should occupy the dorsal position, with elevated nates, a cylindrical speculum is inserted into the vagina, the cervix exposed and pressed well within the lumen of the instrument. After cleansing the canal, iodine, nitrate of silver solution, liquor ferri, etc., are poured in, in sufficient amount to cover the cervix, which organ is exposed to the action of the agent for a few minutes. This process may be repeated as often as may seem necessary. In case the cervical canal is patulous, the solution may also be applied to it by means of an applicator. In order to allow the solution to flow out, it is simply necessary to depress the speculum without withdrawing it, and to receive it in a pus basin. The vagina may then be injected with warm water, or, in case a strong solution has been used, with a neutralizing solution, as common salt, in case of silver solutions. A tampon is then inserted into

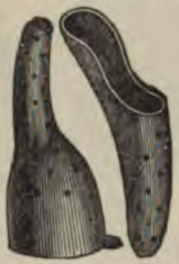


FIG. 85.—BATH SPECULUMS.

the vagina. In case it is desired to bring the solution in contact with the vaginal walls, then the speculum may be gently rotated outwards, as far as the introitus, when, as the vaginal walls close together, they are bathed in the solution. In making such applications it should be remembered that while the cervix generally is not sensitive, the vagina is, and that hence it is advisable to remove by injections any excess of the fluid which has been applied.

Bandl has described an excellent way of administering the local bath,

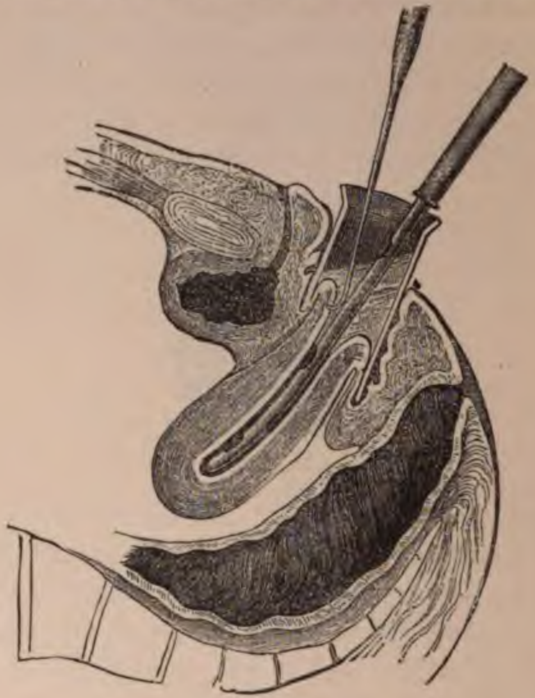


FIG. 86.

in order to render many intra-uterine procedures aseptic. The patient should lie in the dorsal position, with the nates elevated so that the vulva is directed upwards. A short Bandl speculum is inserted, the cervix exposed, and enough carbolic or other medicated fluid poured in to cover the organ. While the speculum is held with one hand, the sound, the curette, etc., may be used with the other, and similarly the cervix may be scarified. (Fig. 86.) In the same way the Cusco speculum may be used, and it has the advantage of being self-retaining, but since the instrument does not protect all of the vagina, strong fluids should not be used.

III. THE USE OF THE APPLICATOR.

Applications to the cervix have been often recommended. Aran and Johns used tincture of cantharides and gutta-percha dissolved in chloroform, Mikschik and Andreeff tincture of iodine, Losada chloroform. Generally, formerly, astringents were applied by a camel's-hair brush, a sponge, or cotton, to the vagina and to the uterus, as far as possible. The cotton-wrapped applicator, as recommended by Playfair, Fritsch, Braun, and others, has in my hands displaced all other means.

Playfair used metal probes, Braun hard rubber applicators, grooved at the tip, Fritsch has modified Playfair's probes, and calls them uterine applicators, Menière has devised an instrument which he calls the "graphidometer;" in fact each gynecologist has devised an instrument according to his inclination.

For many years I have used wooden and metal applicators. I have a number of pieces of ordinary kindling wood, cut about seven inches long, and wrap the extremities with cotton. These I use in the vagina to wipe up blood and secretion, and after being used they are thrown away. By means of these cotton sticks applications may also be made to the vagina.

For uterine applications I possess the metal applicators either in one piece, or else with the extremity of aluminium or platinum, and they are either grooved or roughened. These applicators may readily be cleansed, and it is not difficult to wrap them with cotton. A piece of cotton is flattened out in the right hand, the applicator is laid upon it and by rotatory movements the cotton is firmly wound around the applicator. After having made the application, the cotton may be readily removed if the applicator is conical in shape. In case of difficulty, the cotton may be burnt off. With a little practice the wrapping is readily accomplished, but if it has not been applied closely enough and slips off in the uterus, this matters not, for the organ will expel it. It is of advantage, of course, to have a number of such applicators ready wrapped at hand.

Fluid medicaments are readily applied to the vagina. Solutions of nitrate of silver, tannin, alum, sulphate of copper or of zinc, acetate of lead, chloroform, collodion, carbolic acid, etc., are used. The cotton stick, however, is most frequently used for cleansing and disinfecting the vagina. For such purposes, or for the applications of weak solutions of medicinal agents, a large cotton stick is impregnated and the vaginal walls are swabbed with it. It is thus possible to penetrate thoroughly into the vaginal folds and rugæ.

In order to make applications to the cervical and the uterine cavities, we take slender applicators, not wrapped too tightly, else they will not absorb sufficient fluid. The mucous membrane must be thoroughly cleansed before the application. The cervix is steadied in the speculum by a tenaculum, and a dry applicator is inserted in the uterine cavity, in order to cleanse it. Where the mucus is thick, the applicator should be dipped in a 1 to 2 per cent. solution of some alkali. Then the desired agent is applied by means of another applicator. The excess of fluid is wiped away and a vaginal tampon inserted.

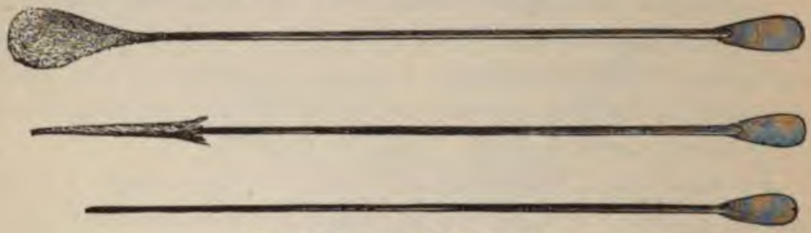


FIG. 87.—APPLICATORS AND PROBES.

It is only exceptionally that it is possible to insert the applicator into the uterus without precedent dilatation. The greater part of the solution is deposited on the cervical mucous membrane and at the internal os. In order to medicate the uterine mucous membrane it is, therefore, desirable to use a cervical speculum.

Applications to the cervix may generally be made through any speculum; those into the uterus necessitate, ordinarily, a duck-bill speculum and a tenaculum. It goes without saying, that before attempting an intra-uterine application, the direction of the canal should be determined by the sound.

CHAPTER XIX.

THE USE OF MEDICINAL AGENTS IN SOLID FORM.

IN order to obtain any other than the mere mechanical effect from a medicinal agent, it must pass into the fluid state. Since, when we use solid agents, we do not know in what amount and in what time it will be absorbed, it seems rational rather to use the agent as a fluid; nevertheless, solid agents are frequently used, not only on account of greater convenience, but because we thus obtain more protracted action on the mucous membrane. The patients are generally able to make such applications themselves into the vagina, although not into the uterus. For a time the insertion of suppositories into the uterus was advocated because uterine colic was less likely to occur than after intra-uterine injections, but this was in pre-antiseptic times. I am able to affirm that in my experience colic is no less likely to occur after the insertion of pencils than after intra-uterine injections. The great advantage of this procedure is the ease with which it is resorted to. We can insert a suppository into the uterus much more quickly than we can inject the cavity, for less patency of the canal is requisite, and we are more certain of dissemination of the agent over the entire endometrium.

It has been often objected to the procedure that the action of the agent is illusory; that the suppositories become coated with an albuminate, and are not dissolved, and this has been proved by placing a stick of lunar caustic in a solution of albumin, when it only dissolved after the expiration of a long interval, if at all. We should remember, however, that the uterine musculature is in constant action, and that the movements are very favorable for the solution and the dissemination of the agent inserted into the cavity. I have often found remnants of secundines, which I did not suspect were in the uterus, coated and impregnated with the iodoform from an inserted penci'

I. Applications to the Vagina.

Lente and many others have invented syringes and insufflators for applying salves and powders to the vagina, without the tampon, and Didot devised a speculum with connected piston. The simplest way to insert a powder into the vagina, is by means of a spoon or a spatula through a speculum. Various astringents are thus utilized, in particular alum, and latterly Fritsch has recommended salicylic acid. Gougenheim uses muslin bags containing nine parts of alum and one part tannin, for which I substitute by preference sublimate gauze, etc. Aran was in the habit of using starch powder for the purpose of retaining fluids in the vagina. Simpson used suppositories and boluses, which the patients could themselves insert into the vagina. To-day it is the custom to use salves worked into suppositories of fat or wax (Simpson), ol. theobrom. (Kidd), starch (Tilt), glycerin. It is well to mix a little emollient ointment with the butter of cacao in order to render the suppositories less fragile. Wax is not a good agent, since it is not at all readily soluble.

In 1848 Dorvault first recommended capsules containing the medicinal agent, and to-day they may be readily obtained in any desired shape. Any astringents, alum, zinc, copper, lead, iron, tannin, resorbents, mercury, iodide of potass, bromide of potass, iodide of lead—narcotics, morphia, atropine, belladonna, cannabis indica, conium—may be placed in these capsules. As a general rule too much of the agent is inserted, with the result of pain, and such sensibility of the vagina as to render further local treatment impossible. Of alum, acetate of lead, tannin, about fifteen grains should be used in suppository or capsule; of zinc, copper, iron, about seven grains, with the addition of some narcotic agent. Alkaloids are not to be recommended, since they are too irritating.

The absorption powers of the vagina are but little known, and they certainly vary according to the thickness of its epithelial coating, and the nature of its secretion. In case of many drugs, for instance the iodide of potass, absorption has been proved by Hamburger, and we witness salivation after the use of mercury, and patients frequently taste the drugs. As regards narcotics, however, the rectum absorbs more quickly.

These suppositories and capsules are inserted, after previous cleansing of the canal, with the patient occupying the dorsal or the lateral position, and remaining quiet for a number of hours. In case suppositories composed of fat are used, it is necessary to order copious vaginal injections in order to remove the masses of fat which remain in the canal, and in this case weak soap-and-water injections are useful.

II. Applications to the Uterus.

Clay, Gautier, Gubler, and a number of recent writers, have insufflated powders into the uterus. We cannot see any advantage in this. More frequently the pencils (crayons, bacili) recommended by Becquerel and Rodier are used, and they are either inserted into the cervical canal or into the uterine cavity. For their insertion either long forceps or specially devised instruments are needed, although any suitably covered catheter, open at the extremity, with its stylet, will answer.

These pencils are made from gum arabic and mucilage, from cacao butter, or gelatin (Trippier). The harder the pencils the more readily they may be inserted, but they are less soluble and more likely to irritate the uterus. I am in the habit of using cacao butter or glycerin, sufficient in amount to make them soft and flexible. The iodoform pencils which I use for disinfecting purposes contain 50 to 75 per cent. of the drug, and are about three and three-quarter inches long, and of varying thicknesses. The more slender ones contain seven and a half grains of iodoform, and the larger about eighty grains.

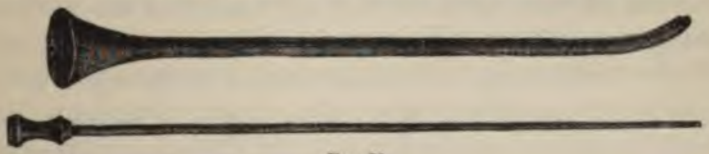


Fig. 88

The most convenient instrument for inserting them is the Dittel's *porte remède*, which is a straight or slightly curved rubber tube furnished with a cylindrical stylet (Fig. 88). By means of this instrument the pencils are readily pushed into the uterus. It is advisable not to use too solid pencils lest they damage the uterus. The patient should lie still a few hours after insertion, in case she has pain. Where the uterus is not very irritable, soft suppositories and those not likely to cause large coagula may be inserted in the consultation room.

CHAPTER XX.

THE USE OF CAUSTICS.

THE time is not so far distant from ours when the entire armamentarium of the gynecologist consisted in a stick of nitrate of silver. Every cervix was cauterized, and only twenty years ago Rigby claimed that we could speak of a new form of inflammation of the uterus, dependent on the misuse and frequent resort to caustics.

Latterly the use of caustics has been lessened owing to the more general resort to many bloody operations, such as curetting, the amputation of the cervix, Emmet's operation, the various radical methods of treating carcinoma, etc.; while, on the other hand, we have learned that diseases which were formerly often fruitlessly treated by the repeated use of astringents, will now yield to a few cauterizations, in particular chronic catarrh and its sequelæ, so that there are still a number of indications for resort to caustics.

A further use for caustics is to stimulate the tissues and lead to healthy granulations. In the first place we stimulate tissues in order to destroy them, and thus we may remove new growths or remnants after excision, enucleation, curetting; thus further we may cause the subsidence of hypertrophies, melt down cicatrices, etc.; further, and this is the chief indication, we cauterize the surface or base of wounds, in order to disinfect them, in order to control fungous granulations, and thus lead to union by first intention. We also resort to cauterization in case of fistulæ in order to cause their surfaces to unite; or we cauterize in order to make cavities from which we may operate beneath the superficies. We propose, however, to speak here purely of the technique of the use of caustics, a discussion of the principal indications being given in another place.

The variety of caustic agents in use is large, although each operator has preference only for a small number. Both the potential caustic agents and the actual cautery are utilized. The first are either in fluid or solid form, by which it is of course understood that the solid become fluid in action. Only in case of weak caustics, which then act mainly as astringents, are we able to limit the action. In this way we may use injections into the vagina or the uterus, pencils, suppositories, tampons, etc. Protection to neighboring organs against the extension of the caustic action is only secured by careful oversight, by surrounding them, where possible, with cotton saturated in a neutralizing solution. In case of the cervix it is necessary to protect the vagina, and this is secured by using the tubular speculum. In case this speculum cannot be used, then the vaginal walls should be protected by retractors. It goes without saying that the speculum must be constructed of a material which can resist the action of the agent or of the heat. Hard rubber possesses this quality to the best degree, since only fuming nitric acid, bromine and chloroform attack it. For further protection it is well to cover the borders of the speculum with cotton or linen, or, if we use a cylindrical speculum, the *culs-de-sac* of the vagina are to be thoroughly tamponed, the part to be cauterized being alone left uncovered. After cauterization any excess of the caustic agent must be removed, and this is accomplished by injections and wiping with cotton. The tampon, which is laid against the cauterized surface, had better be saturated in a solution which will neutralize the excess of caustic.

After cauterization there results a firm, thick slough, which after a longer or shorter interval separates and is shed either in whole or in part. During the separation of the slough, through irritation of the nerves, there exists considerable pain, not necessarily localized in the cauterized portion, but reflex in other parts.

Aside from this sequela, the risks from cauterization lie in the excessively deep action of the agent chosen, or inflammatory reaction in the neighboring organs, usually from the side of the peritoneum; and, further still, there is risk from absorption of the agent, in especial where mercury, arsenic, and chromic acid are used.

In general it may be stated that the more readily a caustic agent unites with the tissue elements, and the more easily it penetrates into the finer lymphatics, the less the resulting pain, and the more intense the action. The stronger the agent and the greater the surface affected, the more care must we take in cauterization and the more quiet must the patient remain afterwards. The reaction which sets in in the tissue does not alone depend on the quality and the quantity of the caustic which used, but also, and more frequently, on the vitality of the diseased tissue which varies, of course, with the individual and with the time chosen.

After the slough has separated, there remains a granulation surfa which cicatrizes from the periphery towards the centre, and hence resu contractions from the shrinkage, which we cannot always limit. In ca of cauterization of cavities and fistulæ, we aim at obtaining uni between the surfaces in order to close them. At times there rema cicatricial bands, as, for instance, are met with in the vagina. In the instances the frequent passages of sounds and application of tampo will tend to keep the cauterized surfaces apart, and lead to quick epit lialization of these surfaces. We must aim, usually, not to cauterize deeply, and, above all, not to entirely destroy the mucous membrane. long as the base of the glands in this membrane are unaffected, regene tion is possible, but if they are destroyed completely, the mucous me brane is not reformed, but in its stead cicatricial tissue.

Where we apply the fluid caustic by means of the applicator, we m ay limit the action by the amount of fluid used and the degree of force w th which we apply the applicator.

Vaginal injections after cauterization should not be neglected. Th ey cleanse the surfaces of secretion, and they should be ordered a numbe of times daily, and to the water a disinfectant should be added, or, in c se of deep irritation of sensitive parts, a decoction of flax-seed, milk nd tincture of opium, etc., may be used.

Many women bear the application of very strong caustics with ut reaction, while in others the sequelæ are severe, such as pain, depressi n, and the like, especially when we have cauterized near the menstr ual period. The menses are ordinarily altered in rhythm and in quant ty. It is advisable, hence, to cauterize in the intermenstrual period. he general contra-indication to the use of any caustic agent is the prese nce of an acute inflammatory process.

I. The Potential Caustic Agents.

Lunar caustic is the most frequently used agent. It is one of t he weakest caustics, and is still more frequently used in fluid or ointme nt than in solid form. Concentrated solutions are applied by long cotto n sticks to the diseased parts, or else they are poured into the vagina and thus brought in contact with the cervix. After each application the parts should be irrigated with water until it returns clear. In case of cauterization of sensitive parts the immediate application of an ice compress will check the pain. This caustic is used in substance on a caustic-holder or held in dressing forceps. In order to weaken the action of the stick it may be ordered made with one to two parts of nitre; and to render it less fragile, Ellis and Chassaignac have caused it to be perforated with platinum wire. Still, the breaking off of the stick in the cervix is not a dangerous thing, although severe colic and painful cauterization may result.

This caustic causes a greyish white slough which limits the deep action of the agent; after two to three days the slough separates with slight hemorrhage, and four to five days after the first cauterization it may be repeated.

Nitrate of silver in solid and in solution is used, in particular, in case of superficial catarrhal erosions, in ulcers with fungous granulations, in follicular and herpetic affections of the cervix, in chronic catarrh, in pruritus, in follicular vulvitis, in case it is desired to cause adhesion between the walls of cysts in the vagina or on the external genitals. Often in case of masturbation it is a good plan to cauterize the entire surface of the external genitals, and at times cure may thus be attained. Aside from the pain caused by this procedure, it may cause cicatrization, and I have seen a case where there resulted contraction of the preputium clitoridis, so that there was retention of smegma and the formation of a cherry-size tumor, which stimulated hypertrophy of the glans.

Many writers, in particular Tyler Smith, use no other caustic agent, and claim that with lunar caustic they can attain any desired action.

In case of readily bleeding growths, papillary ulcerations, epithelial cancer, etc., lunar caustic does not answer. Its action is too weak to cause destruction, and it rather leads to increased growth and greater malignancy of the tumor.

In order to place the solid stick in the uterine cavity many instruments have been devised, for instance those of Scanzoni, Lallemand, Chiari, Säxinger, Bandl, etc. Pencils of lunar caustic may be inserted by means of the so-called "uterine pistol," or we may use Chiari's porte-caustique modified (Fig. 89, *a*), or Bandl's instrument (Fig. 89, *b*.)

The patient should preferably occupy the lateral position, the cervix being exposed by a duck-bill speculum and steadied by a tenaculum, the stick of caustic is inserted even as is the sound. In case the os is not sufficiently patent, dilatation is requisite. Before the insertion of the caustic we should test with the sound the length and direction of the uterine canal, the porte-caustique should be given the requisite curve, and pushed quickly, although not too forcibly, into the uterine cavity. The caustic stick may also be inserted without the speculum, although then the neighboring parts must be all the more carefully protected by cotton, or else during the insertion the vagina should be irrigated with lukewarm water or a weak saline solution.

When the caustic is in the uterine cavity, a portion dissolves in the fluid in the cavity, and a portion forms an insoluble albuminate of silver. By moving the instrument around we endeavor to break up this albuminate, and further to bring the caustic in contact with the entire endometrium. After the lapse of about one minute, the instrument is withdrawn, and this is often difficult, owing to energetic contraction of the internal os. The mucous membrane at this site sinks into the fenestræ of the porte-caustique, and it may be torn off, by over energetic traction, and this is a frequent cause of metritis and of parametritis. It is well to desist from traction until the spasm at the internal os has relaxed.

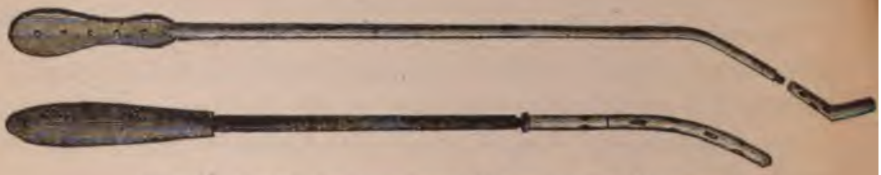


FIG. 89.—*a*, CHIARI'S PORTE CAUSTIQUE. *b*, BANDL'S PORTE CAUSTIQUE.

After cauterization the vagina should be irrigated to remove remnants of the agent, and a tampon should be inserted to further protect the vagina

Often during cauterization severe pain sets in, of a bearing-down character; during the following twenty-four hours uterine colic is not infrequent, and we may be obliged to administer narcotics and to order poultices. Where the tolerance of the patient is not known, it is advisable to keep her quiet for one to two days after cauterization. From five to ten days thereafter the slough separates, often with hemorrhage. In general the process should be repeated only once during the intermenstrual period.

The caustic-holder after use must be carefully cleansed, preferably by heat. There is risk of a portion breaking off in the uterus, and on one occasion I removed a platinum cup from the cavity.

Lunar caustic is used in the uterus in case of chronic affections of the mucous membrane, where there are soft granulations and new growths in its cavity, often after curetting, in case of hemorrhage, subinvolution, etc. To-day the procedure is not so frequently resorted to, and the applicator or injection is considered safer and more rational.

Of the caustic preparations of mercury, the liquor Bellostii, recommended by Récamier, Lisfranc, Velpeau, Bennet, and others, is frequently used. It is indicated in case of superficial, readily bleeding, fungous and varicose ulcers, and is applied either by the local bath, or by means of an applicator. There results a dirty-grey thin slough, fairly adherent, which separates on the third or fourth day. This agent is more energetic than lunar caustic, and it must be used with caution, especially in view of the risk of absorption and the resulting salivation, etc.

Of the other metallic caustics, arsenic, the hydro-chlorate of gold, Landolf's paste (the chlorides of zinc, of bromine, of antimony, of gold), etc., are indifferently used, although the chloride of zinc is the best of all when we desire energetic, deep cauterization, as, for instance, after curetting a carcinoma.

The chloride of zinc is used either in paste form (Canquoin's), consisting of one part of zinc chloride to three of starch, with the addition of a little water and alcohol, or it may be shaped into pencils, or applied on cotton dipped in a saturated solution. The energetic action of this agent should be borne in mind, and the surrounding parts should be carefully protected. The slough separates in from eight to fourteen days, and a readily granulating and healing surface is left.

The more active and fluid the caustic agent used, the greater necessity of localizing its action at the desired spot. This is very difficult to do, although the Atthill and Peaslee tubes assist us, but before they can be used the cervical canal must be dilated.

The most frequently used acid caustics are, nitric acid (recommended by Atthill, Bell, Betz, Braithwaite, Churchill, Edis, Rokitansky, Tilt, and others); chromic acid (Koeberlé, Sims, Wooster, and others); acetic acid (J. Simpson, Curie); sulphuric acid (Selnow); carbolic acid (Goodell, Playfair); bromic acid (Routh, Schroeder, Wynn Williams); the sesquichloride of iron (Braun); salicylic acid (Grünewald), etc.

Nitric acid is used either in the concentrated form, or else as fuming, and this is my preference. It causes a soft, yellow slough, which is shed about the eighth day, and leaves a cicatrizing surface with marked tendency to contraction. The acid is applied by a glass rod, or a platinum applicator wrapped with cotton, and by the latter means its action may be more readily localized, only it is less intense, seeing that contact with the cotton oxidizes it. A slender asbestos rod is the preferable means of applying this acid, unless it is desired to cauterize extensive surfaces when cotton or charpie impregnated with it should be used. In case it is desired to cauterize the uterine cavity with this agent, the cervical speculum should be used, and then either the applicator or small pieces of asbestos saturated in the acid are inserted into the cavity. Rokitansky has devised a syringe, like Braun's, for injecting the acid. The extremity of this syringe is made of platinum.

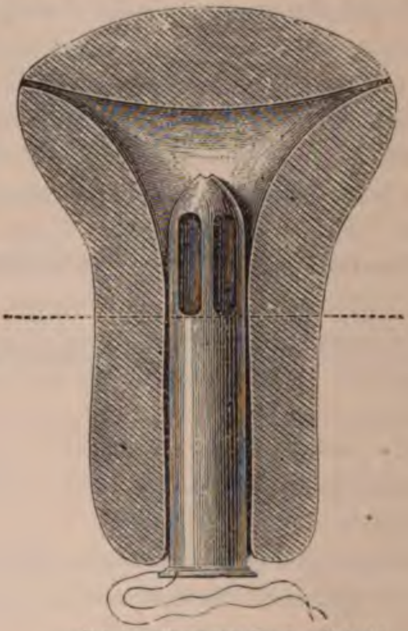


FIG. 90.—PEASLEE'S TUBE. (*Beigel.*)

After cauterization similar precautions as regards injections and tampons are to be observed, as after the use of other agents. The difficulty of localizing the action of nitric acid is the main objection to it. Palfrey has recorded a case of tetanus following its use, and Wigleworth an instance of occlusion of the cervical canal. Further, after the concentrated, not the fuming acid, hemorrhage may set in if the parts are very vascular.

Chromic acid, which is recommended in particular by Sims for cauterization of granular erosions of the cervix, may be used in crystalline form, or in concentrated watery solutions. The crystals are directly applied on the site which we wish to cauterize, but since they dissolve very quickly we must either speedily irrigate the vagina, or else be prepared to wipe off the surrounding parts. The resulting slough is dark brown in color, and very firmly adherent. It is shed with slight hemorrhage on the tenth to the fourteenth day.

After cauterization with chromic acid, we frequently witness a series of very alarming symptoms. The patients suffer severe pain, nausea, vomiting, cold sweats, loss of consciousness, diarrhœa, symptoms which are likely to be laid to the fact that the women are peculiarly sensitive. Latterly, however, the toxic action of chromic acid, to which Gubler, in 1872, first called attention, has been proved by the experiments of Bruck, Gergens, Jacob, Koeberlé, Mayer; and Mosetig has reported a fatal case after the application of the acid to a carcinoma of the breast. It is customary to-day, hence, not to resort frequently to chromic acid except in the treatment of small granulation surfaces and papillary excrescences.

Bromine, on the recommendation of Routh, Wynn Williams, Schröder, Graily Hewitt and others, is used particularly in the treatment of carcinoma, especially after curetting, and Henneberg has demonstrated its action on the cancer cell. The agent is either used alone, or else, to lessen the danger of explosion, mixed with alcohol (1:5 to 1:10). It is preferably applied by asbestos pencils, or else injected into the growth (Schröder). The solution of bromine in sulphuric acid is not so dangerous and less unpleasant, but not so active. Tampons soaked in the solution may remain *in situ* for twenty-four hours and over, then should be placed tampons saturated in an alkali to neutralize any excess. After the removal of the tampons Schröder orders vaginal injections of a weak bromine solution and then cauterizes again at the end of eight days.

The great disadvantage of bromine is its objectionable odor, and its effect on the respiratory organs.

Originally advocated by Playfair, carbolic acid, concentrated or mixed with equal parts of tincture of iodine, is used as a caustic. It is painted over the parts.

The technique of the use of the above agents differs according to the case. They are all useful not only to cause the breaking down of new growths or the eradication of polypoid and papillary excrescences, but also in case of obstinate catarrh and blennorrhea of the cervical canal and body of the uterus, conditions in which the uterus is often wonderfully tolerant. We must be careful not to obtain too deep action of the agent, especially when we are working near the peritoneum.

Of the alkalies, caustic potass, so warmly recommended by Amussat, Barnes, Bennet, Récamier, Simpson, Tilt and others, is scarcely at all used to-day. It may be applied in the form of pencils, or else as the Vienna paste. The pencils are grasped in a dressing-forceps, and held in contact with the diseased surface for a few seconds, or the parts may be rubbed with them. Since caustic potass is so very deliquescent, the surroundings of the cauterized surface must be carefully protected by cotton dipped in vinegar, and injections of slightly acidified water be administered afterwards.

The resulting slough is soft, slimy, tinged with blood, and it separates in from eight to fourteen days, leaving a deep cavity which only at the end of four to six weeks becomes filled up with a strong, constricting cicatrix. There is often hemorrhage on separation of the slough. For this reason, and on account of its great spreading powers, and further, because it frequently causes cicatricial contraction of the cervical canal or orifices, caustic potass is seldom used. As Duparcque pointed out, this agent penetrates deeply, and may easily injure the neighboring organs; its use is very painful, and for this reason a little morphia has been added to the Vienna paste. Tilt has noted sharp depression after its use. In the past the indications for the use of the agent were manifold. Bennet and Tilt were in the habit of applying it in case of chronic metritis and hypertrophy of the cervix, and Tilt removed on one occasion as much as an inch of the cervix in this way. Amussat resorted to the agent in chronic endometritis, and also applied it to the posterior fornix in case of retroversion, in order to cause this site to unite with the cervix, and thus to cure the displacement.

To-day it is no longer the custom to remove an elongated cervix with a caustic agent, and we no longer endeavor to cause cicatricial contraction of the vagina, since this canal may be narrowed in other more certain ways.

II. THE ACTUAL CAUTERY.

In gynecology heat as a caustic agent is almost uniformly used in a glowing state. Since its recommendation by Jobert, it has found favor with Aran, Becquerel, Chalvat, Chiari, Gallard, Grenet, Greenhalgh, Grünewald, Hegar and Kaltenbach, Hoppe, Joseph, Laurès, Olshausen, Scanzoni, Spiegelberg, Veit, and others. Only exceptionally is it used in the flambent state. In comparison with the indications laid down for the use of the potential caustic agents, the actual cautery ranks above them whenever we wish to break down tissue quickly, and to cause speedy separation of the slough, leaving a cleaning surface with tendency towards rapid healing; when further we aim at checking or preventing hemorrhage. A further advantage is that we can limit its action. The action of heat is different according as we use it in white, red, or dull-red form, the former being most intense.

Glowing heat is utilized for amputating tissues without the risk of much hemorrhage. The galvano-cautery wire finds here its peculiar field. Frequent application of white heat, however, does not cause a deep slough, and therefore in case of large tumors, in particular carcinomata and sarcomata, as much as possible is removed by the knife, scissors or the curette, and the base is afterwards cauterized. The actual cautery is also of service in case of papillary erosions of the cervix, and frequently a single energetic application will cure cases which have resisted other caustic agents, in particular where the erosion is seated on the everted cervical lip. Further still the actual cautery often answers well in chronic catarrh of the cervix, and Spiegelberg was in the habit of using it in case of hemorrhage and blennorrhea, hyperplasia of the mucous membrane and sub-involution of the uterus, making the application into the cavity of the uterus. In case of parenchymatous hemorrhage from large wounded or ulcerated surfaces, such as exist after curetting for carcinoma, or after amputation of the cervix, the clitoris, the nymphæ, the cautery is useful, although ligation of the bleeding vessels and covering the surfaces with mucous membrane is preferable. Where, however, union by first intention cannot be obtained, the cautery is an excellent hemostatic, provided it be not brought in contact with large vessels, and the cherry-red, not the white heat should be used. The cautery is also useful for cutting through the pedicle of ovarian cysts (Clay, Baker Brown, etc.). Further the cautery has been utilized for causing loss of substance in diseased or sound mucous membrane for its derivative effect, and Dupuytren advocated the central and peripheral cauterization of vesico-vaginal fistulæ to cause union, a procedure to which nowadays we resort only where the fistulæ are so small as to be covered over by the slough. Finally Eder and Prochownik have recommended ignipuncture, and it has served me well in case of ectropion and great hyperplasia of the cervix, as also for the peripheral cauterization of tumors (Nussbaum).

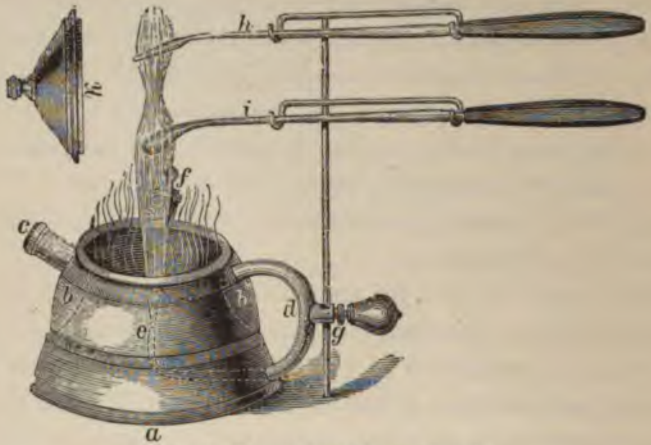


FIG. 91.—FURST'S APPARATUS. (*Beigel.*)

The great obstacles to the general use of the actual cautery is the fear of the patients, and the difficulty of applying it in cavities, objections which do not hold, however, for the galvano-cautery. Pain is less intense after the cautery than after the application of any other of the stronger caustics. The patients often only complain of a sensation of heat, and this disappears on irrigation with cold water. The cautery is contra-indicated in the presence of acute inflammatory processes, and also in the neighborhood of sensitive organs, in particular the peritoneum. Inflammatory reaction after the use of the cautery is rare, although instances of peritonitis, metritis, and parametritis are known, while reflex irritation from or great irritation of the cauterized parts, leading to suria or ischuria, is frequently witnessed. Great hyperesthesia of the dividual, and old age, contra-indicate resort to the cautery, although e may control the first by chloroform.

The cautery apparatuses are represented by the hot iron and the alvano-cautery. The cautery irons are of various shapes, the extremity ing pointed, flat, or olivary. The size varies according to the locality here it is to be used, very large irons being requisite for large surfaces avoid rapid cooling.

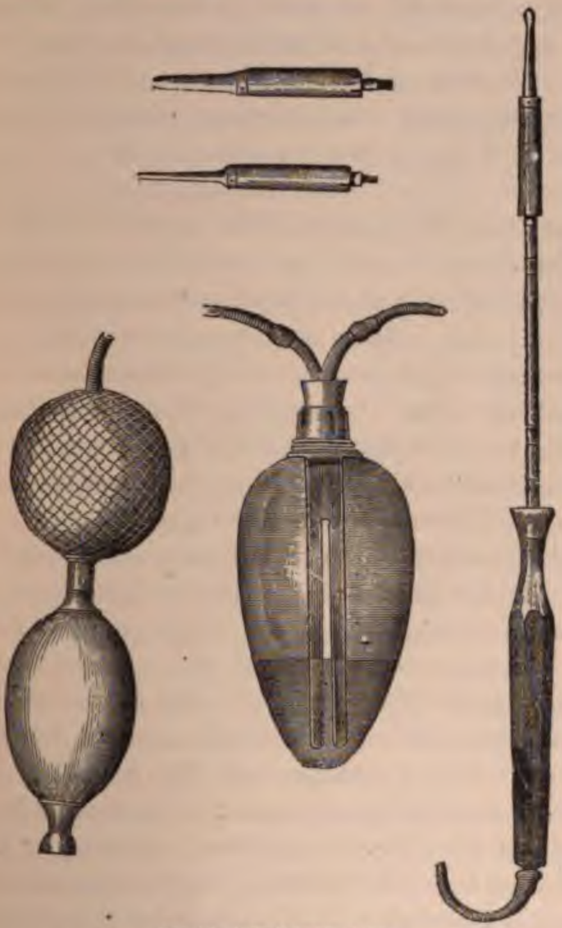


FIG. 92.—THE THERMO-CAUT

These irons are heated over a lamp, gas, or a Bunsen burner. Fürst's aratus is a good one for heating small irons. Latterly Paquelin's thermo-cautery has displaced other forms. Its shape is convenient and the requisite degree of heat may be secured and maintained as long as is desired.

The objection to these apparatuses is that they must be applied in the heated state to the desired site, and the cautery irons rapidly lose their heat and must be frequently renewed. In consequence it is only exceptionally that the cervical canal is patent enough to permit of the use of the cautery in the uterine cavity, and on account of the advantages of the galvano-cautery it is to-day used in preference wherever possible. First recommended by Hüter, in 1845, the galvano-cautery was used successively by Crussell, Sédillot, John Marshall, Harding, Waite, Hilton, Nélaton, Leroy d'Etiolles, Amussat, Ellis, and Middeldorpff still further popularized its use, and his instrument, with slight modifications, has remained the most efficient. Middeldorpff used the Bunsen elements (zinc and carbon). Bruns preferred the zinc-iron combination; the most compact instrument is the Dawson battery, which consists of zinc and platinum, and which has the advantage of not becoming polarized. We have reason to expect that in the near future the manufacture of convenient accumulators will do away with all the disadvantages resulting from the use of the batteries at present in vogue.

Instead of the cautery irons, round or sharp applicators of porcelain are used, or else the knife-shaped or pointed galvano-cautery instruments. The disadvantages from the use of the galvano-cautery in comparison with the cautery iron are the cost of the apparatus, the frequently required cleansing and filling of the cells, the fact that the current is liable to sudden interruption, or at least to alteration in intensity, and further in that its action is circumscribed. The majority of these objections do not hold when the instrument is of correct construction, although it is still true that it is difficult to maintain an even degree of heat, and to prevent changes during the operation. On the other hand, the advantages of the galvano-cautery, such as the obtaining of the highest possible degree of heat, the ability to exactly limit the action, the fact that the applicator may be placed cold at the desired site and gradually heated, these are so manifest that the apparatus deserves a place in the armamentarium of every gynecologist.

The cautery should only be used after careful exposure and isolation of the part to be acted upon. For this purpose the tubular specula are the best, either those constructed of horn, ivory, wood, hard rubber; the double specula which are kept cool by a current of water, interfere with the field of vision. In case duck-bill or valvular specula are used, then the projecting portion of the mucous membrane must be protected by depressors, or by cotton, etc., packed against it. An irrigator filled with cold water should be always ready, in order that an injection may at once be administered if the patient complain of burning. For the protection of adjacent organs, when, for instance, the pedicle of an ovarian cyst is burnt through, flat, broad, clamps or forceps (Baker Brown) have been devised. An exposed surface may be surrounded by a wall of wet cotton, or else by a wet sponge.

After thorough cleansing of the surface to be cauterized, the heated iron is applied to it for a few seconds, or it is carried directly into the cavity which is to be cauterized. The superficial layer of epithelium is at once destroyed, and by longer action an adherent, brown slough, a few lines thick, surrounded by a red, slender zone, is formed. In case we desire to penetrate more deeply, a number of irons must be used in succession, or else the thermo- or the galvano-cautery must act for some time, in order to burn through the slough, which limits the extension of the heat. In case during the application hemorrhage occurs, then before the use of a second iron the blood must be carefully wiped away. At the end of the procedure, or when it is of long duration, while it is in force, cold water should be injected until the burning sensation has disappeared.

Slight losses of substance heal under the scab, but generally this is shed with suppuration and the passage of broken-down particles within six to fourteen days, and a granulating wound is left which frequently only cicatrizes at the end of a number of weeks.

Cauterization of small ulcers and growths on the cervix may be performed on out-patients; but in case of deeper cauterization of larger growths the patient should stay in bed for two to three days, and the local reaction more quickly passes away. This precaution is all the more necessary when the interior of the uterus has been cauterized, or when with the separation of the slough hemorrhage is to be anticipated.

CHAPTER XXI.

THE USE OF THE TAMPON.

I. The Tamponade of the Vagina.

THE tamponade of the vagina is resorted to for various purposes:

1. *As a supporting Measure.*—The tampon is inserted into t vagina for the purpose of holding instruments in place, as for instan the intra-uterine stem, the sponge or the laminaria tent. Further, it used for limiting the mobility of the uterus, or else to act as a pessary keep the uterus in good position. Either the cervix or else the *cul-de-* are the points where the support is applied, as where, for example, fill the *cul-de-sac* towards which the uterus tends to fall with tampons order to prevent this tendency.

2. *As a Protective.*—Where erosions, ulcerations, or wounds of t cervix exist, irritation is prevented by covering the surfaces with a tamp and we thereby also prevent the contact of the secretions with the wou or else absorb it with the cotton. The tampon answers a similar purp in holding the vaginal walls apart from one another.

3. *For the Purpose of Pressure.*—The tampon is thus used in case hemorrhage, congenital or acquired stenosis, or cicatrices in the vagi in the latter instance in place of dilators. Particularly in the presence hemorrhage should the tampon be firmly pressed against the bleedi site, and where astringents are combined with the tampon, the resulti contraction of the vagina intensifies the pressure. If astringents are used then a number of tampons must be inserted to obtain effectual co pression.

4. *As a Medicinal Measure.*—Here the tampon, being medicated, therapeutic agent is kept longer in contact with the vaginal walls or cervix

5. *As a Diagnostic Measure.*—The object here is to obtain the sec tion from the uterus, to assist in diagnosis. (Schultze's test-tampon.

The material for the tampons is generally cleaned, absorbent cott

A piece as long as a finger and as thick as the thumb is taken and is tied in the centre with a string, by which the patient is able to remove it. Lint, salicylic cotton, carbolized cotton, bags filled with wool, charpie, strips of calico or muslin, iodoform gauze (20 per cent. to 50 per cent.), may also be used. The iodoform or linen, etc., is inserted in a continuous strip, one end hanging from the vulva for the purpose of removal. In addition, various articles have been used, such as an animal bladder (Cliet), a linen cylinder packed with cotton (Scanzoni), the colpeurynter, which is particularly useful where greater pressure is desired.

For introducing the tampons either a speculum is used, or else they are inserted by dressing-forceps, or a tampon-carrier, the vaginal walls being held apart by means of two fingers of the other hand. In case a tubular speculum is used the tampons must be held in place by means of dressing-forceps or a sound, while the speculum is withdrawn, and where a duck-bill or valvular speculum is utilized, care must be taken to pack the tampons well beyond the blades. It frequently suffices to place the tampon near the cervix and then the finger alone accomplishes this. The advantage of insertion through a speculum is that the generally sensitive introitus vaginæ is not thus brought in contact with the medicinal agent in the tampon.

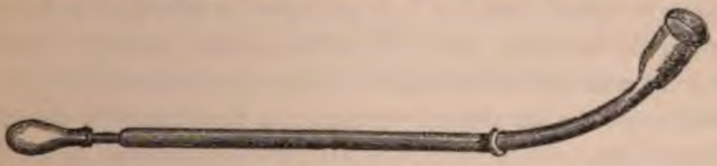


FIG. 93.—TAMPON-CARRIER.

In case the tampon must be inserted without a speculum, then it is best seized in a broad-bladed dressing-forceps, which protects at least a portion of the cotton from contact with the vaginal introitus. The procedure is also simplified by smearing the introitus with fat. Strong medicaments are always to be avoided when the tampon is inserted without a speculum or by the patient herself. For the latter purpose, Sims, Braun, Weisl and others, have devised tampon-carriers. The instrument described by Sims and modified by Braun, consists of a cylindrical tube curved to coincide with the pelvic axis. In this tube slides a rod which pushes out the tampon. Weisl's apparatus is more complicated, and consists in a combination of the Cusco speculum with a piston.

Many women are able to use a porte-tampon readily, although generally they are unable to place the tampon at the desired spot.

If the tampon be used for retention then a large roll is inserted, and this is held in place by smaller ones. It is generally unnecessary to fill the entire vagina; even in case of hemorrhage it is sufficient to fill the *cul-de-sac*, for thus the cervix is surrounded and compressed.

In case more tampons are inserted into the vagina, then its S-curve is destroyed, and the walls are incited to contract, and thus there is a tendency to expel the tampons. Where it is essential to keep the vaginal walls apart or to bring some medicinal agent in contact with them, then the canal may be filled with thick and long cylindrical rolls of cotton.

Plain cotton tampons should not remain in the vagina longer than twelve hours, since at the end of this period they have absorbed the secretion as much as possible, and this degenerates, giving rise to foul odor, acting as an irritant, and even becoming the source of infection. Dry tampons are seldom used, but it is preferable to wet them and squeeze them dry, for thus they are more readily pressed together. Tampons which have remained in the vagina for a greater length of time through forgetfulness, have, on careless examination, been mistaken for broken down carcinoma. To prevent decomposition, it is advisable to use salicylized cotton, or else cotton which has been impregnated with some disinfectant, such as glycerine, carbolic, chlorine water, alcohol, thymol; iodoform gauze tampons may remain, as we have stated, for two to three days.

The tampons may be removed through a speculum by means of dressing-forceps, or else by exerting traction in the axis of the canal on the strings which are attached to them. In case a number have been inserted they should be removed in the order the reverse of that in which they were inserted. The patients frequently remove the tampons themselves, and they only find this difficult when they make traction in the wrong direction. They should be instructed, therefore, to squat or lie on the back and to pull the strings in a direction downwards and backwards.

If the tampon is intended to act as the carrier of some medicinal agent, then the latter should be used in watery solution or with glycerine. In this way the same astringents, narcotics and resolvents, are used as in case of injections. Agents in glycerine, and glycerine alone, not only tend to prevent decomposition, but they also cause a profuse transudation of serum from the mucous membrane. Sims and Fürst used glycerine alone; Gosselin added iodide of potass to it, and Gustin, Demarquay and others, tannin, and these agents are now universally used. Five to ten parts of iodide of potass to fifty of glycerine, and five to twenty-five of tannin, alum, sulphate of zinc or copper, with glycerine, are used, the alum, zinc and copper having the advantage over tannin that they do not soil the clothing. The medicinal agent may also be applied on the tampon in the form of an ointment, as Rochard, and in particular Hildebrandt, have recommended. Either fat, simple ointment, benzoinated ointment, or the glycerine ointment (one part glycerine to four of starch) recommended by Tilt, may be used. Vaseline, the petroleum ointment, is preferable to all of these, since it is absolutely without odor, does not become rancid, and I use it in every instance where a fatty base is required. The ointments may contain half again as much of the agent as the glycerine solution, and the tampon coated with it is best inserted through a slender bladed valvular or a duck-bill speculum, care being taken that the ointment does not rub off on the speculum.

Drugs in the form of powder may be used as well as ointments, the tampon being simply covered with them, and inserted as usual. Alum, as recommended by Scanzoni, is thus very frequently used, either the plain powder or else mixed with equal parts of powdered sugar or starch. The plain alum tampon is a most energetic astringent, frequently causing intense burning pain, contraction of the vagina, and loss of the epithelium in flakes or as a cast of the canal. For this reason the powder should be used weakened at the outset, and only in its full strength at the beginning of three to four days. Instead of sprinkling the powder over tampons, it may be placed in little bags for insertion into the vagina. Narcotics and vesicants may be used as well as astringents. The powder may further be insufflated into the vagina and a tampon inserted afterwards.

In order to obtain the effect of cold in the vagina, Aran recommended the insertion of pieces of ice; it is preferable, however, to order cold injections or else to insert one of the previously described Heitzmann regulators or a colpeurynter filled with ice water.

Before applying the tampon the canal should be cleansed of secretion by a lukewarm or a cold-water injection of soap suds, of a weak alkali solution or a disinfectant, etc. The same procedure should be repeated after removal of the tampon, and often it must be frequently repeated in order to wash away the flakes of epithelium or insoluble albuminates which result from the use of astringents, and which on the one hand irritate the vagina, and, on the other hand, interfere with the action of the second tampon.

For a number of years Schultze has recommended the tamponade of the vagina, in order to collect the secretion from the uterus for examination, a procedure which Kiwisch had previously favored. I have often resorted to this test-tampon, in order to differentiate a catarrh of the body of the uterus, in the absence of much secretion. For this purpose, after washing out the vagina and removing the secretion from the cervix, a flat cotton tampon, soaked in a 10 to 20 per cent. solution of the glycerole of tannin, is applied through the speculum against the external os, and over this are applied a number of similar tampons to hold the first in place. The vagina contracts around these tampons and holds them well in place. After a day's interval, the tampons are carefully removed in the reverse order in which they were inserted, preferably through a duck-bill speculum. On the last tampon the secretion has collected, and at the spot corresponding to the external os, there is a mass of mucus, pus, blood, etc., which may be submitted to a microscopic examination.

II. The Tamponade of the Uterus.

This procedure subserves two purposes, either to check hemorrhage or else to bring medicinal agents directly in contact with the mucous membrane.

Kristeller used two instruments for tamponading the uterus: a quadrilateral, blunt-pointed sound, and a small slide to push the cotton off the sound. I have always used for this purpose the ordinary tampon-carrier with attached slide.

The point of the instrument is wrapped with a thin layer of cotton, which is dipped in the desired solution, and a string is tied around the cotton. The cervical canal and the internal os must be patent, or else the tampon cannot be inserted. An obstacle to insertion is offered by the internal os, seeing that this reacts against the various medicinal agents, and contracts. The more complete the previous dilatation the more readily is the tampon inserted. The apex of tampon may be greased to advantage, or else the uterine speculum may be used.

The uterus should be steadied by a tenaculum or tenaculum-forceps, the cervix having been exposed through a speculum, and then the applicator armed with the cotton is pushed boldly through the cervical canal, and the cotton is removed by the slide. In case the uterine cavity is widely dilated as in the presence of myomata, polypi, or after curetting, etc., we can and often must insert a number of tampons, but we should beware of this in case the uterus reacts readily, else the muscular structure is caused to contract energetically, and very severe colic may result. In case a number of tampons are inserted, then different colored strings should be affixed to them, in order to be able to remove them in the inverse order in which they were inserted. These tampons, frequently they have been soaked in liquor ferri, may remain in the uterine cavity for twenty-four hours, although even then they are a trifle foul, and may, through decomposition of the secretion, be a source of danger. In case they are adherent, then attempts at loosening them are made by injecting lukewarm water. The only material which I have latterly used for the tamponade of the uterus, is iodoform or tannin-iodoform gauze. The cavity may be filled with pieces the breadth of the finger, and may remain for a number of days, in case we are not dealing at the outset with a septic wound.

Hegar and Kaltenbach have devised an instrument for inserting these strips, consisting of a sound with perforated apex. Through the perforation a string is passed, which serves to fasten the medicated cotton. The sound is inserted into the uterus, one end of the string is pulled upon until the cotton is loosened and then the sound is withdrawn.

Tents are also used as carriers of medicinal agents. Laminaria or gentian root tents are soaked for awhile in the desired solution, or else are impregnated in some other way with the medicinal agent; they are then dried and inserted in the usual way. In case of hemorrhage, in particular, it is likely that the pressure of the distending tent is also of advantage. The sponge tent, used in this way, is not to be recommended, and the tupelo, for reasons which are obvious, cannot be so utilized.

[Latterly Vulliet has advocated the tamponade of the uterus for the purpose of inspection, and of direct application of medicinal agents to the endometrium. His aim is to obtain permanent dilatation of the uterine cavity, and the method is said to be free from danger, although tedious in its technique. When once dilatation has been obtained, it persists for weeks, and may be maintained even for months. The steps of the method are: The patient should by preference occupy the genu-pectoral position, the perineum being retracted by a Sims speculum. If the cervical canal be not at all patent, a moderate amount of dilatation is first obtained by means of a steel-branched dilator. Small tampons of iodoformized cotton, with a string attached to each, are then pressed beyond the internal os. At the first séance three to four are introduced into the uterine cavity, and are left there for about forty-eight hours. They are then removed and replaced by a greater number, the object being to fill the uterine cavity at each application. The uterus shows great tolerance for this tamponade, and beyond slight colic no untoward result has been met with. The cavity of the uterus is thus gradually distended, and at the end of the treatment, the time required varying from three days to one month, the uterus and the vagina form a single cavity, when the endometrium may be thoroughly inspected, and treatment may be instituted at whatever point it seems desirable. Vulliet has resorted to the method in a number of instances of carcinoma, sessile polpyi, fibro-myomata, and endometritis.—ED.]

CHAPTER XXII.

LOCAL VENESECTION.

GENERAL venesection from the arm or from the popliteal vein is to-day rarely resorted to in gynecology, notwithstanding the advocacy of Lisfranc, Aran, Mascarel, Cassin, Tilt and others. Local venesection, however, from the cervix, the vagina, the labia, the inner surface of the thighs, the neighborhood of the anus, ranks with other gynecological therapeutic means.

Acute and chronic inflammations of the genital apparatus, disturbances in the balance of the physiological hyperemia or in the circulatory system of the uterus, are indications for local venesection, although purely symptomatic, and naturally enough the result of the operation will be the more precise the nearer to the site of local congestion the blood is drawn. Experience teaches that a few leeches applied to the uterus amply subserve the same end as the removal of a greater amount of blood from the abdominal walls.

Until quite recently local venesection was only performed by the use of leeches on the cervix, as recommended by H. v. Nigrosolo and Guilbert, but now, owing to the numerous disadvantages of this procedure, scarification (Spiegelberg, A. Mayer, Scanzoni, Fenner, Schröder), artificial leeches (Storer, Thomas, Leblond and others), acupuncture (Kristeler, Schröder, Spiegelberg, Fritsch, etc.), are preferred.

The aim of each of these methods is the same, the withdrawal of a greater or less quantity of blood from the uterus, the leech and its artificial substitute, however, bringing suction to bear in addition. By means of this suction, a greater amount of blood may certainly be withdrawn, but at the same time greater congestion is produced, which counterbalances the advantages from the depletion, aside from the fact that the suction acts as an irritant which often reacts in an unpleasant manner on the nervous system. Where it is desired to increase congestion, as in certain forms of amenorrhea, partial anemia of the uterus, etc., leeches are unquestionably preferable, and in many instances where scarification is resorted to, especially in case of deep puncture, the same untoward sequelæ may follow as from the application of leeches.

Leeches are applied as follows: The patient should occupy the dorsal position, and a cylindrical speculum should be inserted of sufficient size to surround the cervix, and to prevent a leech from attacking the vagina. Scanzoni recommended the exposure of only one lip of the cervix, but only exceptionally is this possible. Until all the leeches have dropped off pressure on the speculum should not be relaxed. The cervix should be carefully cleansed with cotton, and the external os should be plugged to prevent the leeches from gaining the cavity of the uterus. Even if a leech should enter the uterine cavity, it is hardly likely it will cause severe colic or profuse hemorrhage; still it is essential that the physician should himself watch the application of the leeches, and in case one should enter the uterus that he should kill and remove it, and when the other leeches have fallen off, if one is missing, that he should inject a saline solution into the cervix or the uterine cavity, in order to dislodge it. Tamponing the cervical canal is not a certain safeguard against the entrance of a leech. Weber has advocated passing a thread through each leech before its application, and this is said not to interfere with its suction powers.

The leeches are to be counted, inserted into the speculum, and pressed against the cervix by a tampon. In case it is desired to apply them to the vaginal wall, it is preferable to use a duck-bill speculum. and to insert each leech at the desired spot by means of a glass rod. Generally leeches do not take hold of the vagina readily, except in the *cul-de-sac*, and they should here be watched carefully lest profuse hemorrhage occur from injury to a large vessel. The greater the amount of blood it is desired to remove, the greater the number of leeches which must be applied. Ordinarily we may count on one leech causing the loss of about three-quarters of an ounce of blood, including the after-hemorrhage; still this amount is purely relative, as obviously it will depend on the congestion of the parts.

With the exception of those instances where it is desired to remove a large amount of blood, it suffices to apply from four to six leeches. More than six of the large or eight of the small is excessive, since they interfere with one another.

In a short time the leeches have taken hold, and during the application the patients complain of a greater or less drawing sensation, and the tampon is then to be removed from the speculum. In a few minutes a drop or so of blood will appear, and this is the signal that one of the leeches has dropped off. This leech is at once removed as also any other which may not have taken hold. The insertion of a fresh leech is generally ineffective, seeing that it will satisfy itself with the blood in the speculum. When the last leech has dropped off, and this can at any time be secured by pouring in a little salt solution, the leeches should again be counted, and if none are lacking, the blood in the speculum is allowed to flow out by tipping the instrument, and the speculum is then removed.

If the bleeding is not profuse enough, this may be increased by the injection of warm water, or by the application of hot poultices over the abdomen and the genitals; in case the bleeding is too profuse, then it may be checked by the insufflation of styptic powder (alum, tannin), or by touching the bleeding spots with lunar caustic, the cautery, the injection of liquor ferri, or by the tampon. The surest way is by passing a suture under the bleeding site. Injection of cold water or the application of ice should, where possible, not be resorted to.

The application of leeches to the uterus require a number of conditions. It must be possible to insert a rather large speculum, and yet in the presence of an acute inflammatory process it is often impossible to do so on account of the pain caused. In such instances the leeches may be applied around the anus, or to the inside of the thighs, or on the labia, in which event, of course, the parts should first be shaved. It is preferable to refrain from applying leeches to the uterus in the presence of extensive acute inflammatory processes of the pelvic peritoneum, or the pelvic cellular tissue, for then we are rather likely to increase the congestion than to diminish it. Pregnancy, further, is a contra-indication to leeching, although a number of cases have been recorded where the course has not been interfered with.

The use of leeches is open, however, to a number of disadvantages which make us desire the possession of some substitute. The mere thought of their application and the possibility of their escaping excite the patients greatly, so that often during and after their use there are present nervous disturbances of an aggravated nature. Great pain, more or less uterine colic, even when no leech has entered the uterine cavity, hysterical attacks, collapse, vomiting, the appearance of erythema or urticaria, as noted first by Scanzoni, and then by Veit, Leopold, Schramm, and others, these occurrences are by no means infrequent, and are alarming to the patients and to their attendants. It is, therefore, advisable, before the application, to tell the patient and her friends of the possibility of such occurrences, and further that they do not amount to anything. An injection of morphia, or the local application of an anodyne, generally suffices to overcome these symptoms.

In case a leech has opened a large vessel there may result profuse hemorrhage, and frequently enough the repeated application leads to great anemia. This is true especially of cases of so-called chronic metritis, where repeated venesections have been considered necessary in the treatment, and the cervix may become hard and misshapen from the repeated bites. The hemorrhagic diathesis, the presence of papillary, readily bleeding ulcers or new growths, are contra-indications to the use of leeches.

Another means of performing venesection on the uterus is the opening of vessels by means of cutting or scarifying instruments. For the purpose of scarification we do not need complicated apparatus, such as that of Miller, Storer and others, but a long-handled knife, which is either convex like Scanzoni's or pointed like C. Mayer's. Any sharp-pointed bistoury will suffice, however, or where it is desired to puncture deeply, as is recommended by Kristeller, Spiegelberg, Schröder and Fritsch, any long, stout, sharp needle.

For the purpose of scarification the patient may occupy either the dorsal or the lateral position, and the cervix is exposed through a cylindrical, duck-bill, or valvular speculum, and steadied, if necessary, by a tenaculum. After the cervix has been carefully disinfected, a number of superficial or deep incisions are made radiating from the external os. The more extensive the incisions, the greater the hemorrhage, particularly when the angles of the os are cut. Frequently a number of large vessels are seen under the mucous membrane, and by opening one of these veins profuse hemorrhage may result. Usually, however, only the superficial vessels are thus opened and emptied.

The method of deep puncture, advocated warmly by Spiegelberg, depends on inserting the needle to the level of the internal os, as far as the circulatory system proper of the uterus, and thus the deeper structures are depleted to the extent desired by the operator. The needle is inserted near the os, parallel to the mucous membrane of the cervix, to the depth of three-quarters to one inch, and this puncture is repeated five to six times. In this way, within ten minutes, Spiegelberg has removed 1500 grains of blood.

In case the introitus vaginæ is very sensitive the needle may be guided along the finger.

This method, however, should only exceptionally be resorted to, since it is difficult to control the hemorrhage.

Thomas recommends, before puncture, the production of circumscribed hyperemia by means of a cylindrical hard rubber syringe. Thus more profuse hemorrhage may be obtained, and this is the rationale of the action of the artificial leech.

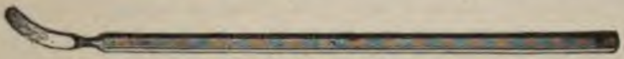


FIG. 94.—SCARIFICATOR.

After scarification and puncture more profuse bleeding may be obtained by the injection of warm water, or by baths.

The hemorrhage generally ceases of itself, and only when large vessels have been opened may it be necessary to resort to the means already outlined for checking it.

After scarification or puncture we never witness such severe symptoms as may follow on leeching; the operation may be performed without the patient's knowledge, and this is often requisite, since the knife is feared, and when the patients are afterwards informed, having suffered no pain, they do not object to repetition of the procedure.

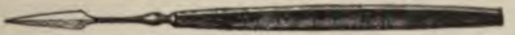


FIG. 95.—NEEDLE FOR PUNCTURE.

Puncture yields so much more blood than scarification that it is generally the preferable procedure, except in those instances where the aim is simply to draw blood from the mucous membrane of the cervix or to open Nabothian follicles. The great advantage of puncture, to which I almost uniformly resort, is that the control of the hemorrhage lies in the physician's hand, and that it may be repeated at short intervals.

Cupping apparatuses and the artificial leech have not become widely used.

After any profuse venesection, the patient should remain for some time in bed. Slight venesection may be practised in the office, although the effect is almost entirely neutralized by the hyperemia of the pelvic organs, which results from the patient assuming the upright position. Furthermore, for a similar reason, cold injections should not be ordered after venesection.

CHAPTER XXIII.

THE USE OF THE CURETTE.

IN 1846 Récamier recommended his well-known curette for the removal of fungosities from the endometrium. Although Chassaignac, and later Becquerel, Dubois, Scanzoni and others, were opposed to the instrument, it still remained in use. Still, only on the discovery of means for dilating the uterine cavity and the resulting possibility of recognizing the proliferating new growths of the mucous membrane, as also the fungous and polypoid forms of endometritis, did the improved Sims curette begin to be used in place of the Récamier, and did it and the Simon sharp scoop become recognized as marked additions to the gynecological armamentarium.

Of the instruments which are used for scraping the endometrium there are, in addition to Récamier's, which A. Martin still prefers, the Sims curette; very similar instruments are used by Spiegelberg, C. Braun and others; the Simon spoon with or without Freund's modification which converts it into an irrigating apparatus.

The curette consisted originally of an oval steel ring, sharpened on one side and fixed to a flexible metal handle, whereby it was possible to give the instrument any desired curve. The more recent instruments have in general been constructed of the same material. Mundé has had dull curettes constructed of copper wire, and these are, of course, softer and more flexible.

This flexibility renders the instrument best adapted for removing soft growths or remnants which have already been scraped off.

Simon's scoops are oval or round, the sharpened edge projects only a trifle, and they are attached to a shaft about seven inches long, the side of which corresponding to the scraping surface is roughened. They are made in varying sizes and thicknesses.

Freund has perforated the shaft so as to allow of irrigation during the curetting.

For the removal of very soft masses the finger-nail, the handle scalpel, the dressing-forceps, answer very well. Farkas' curette ha

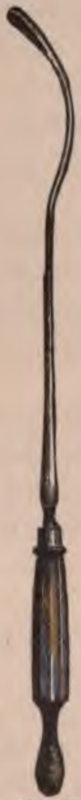


FIG. 96.—THE CURETTE.

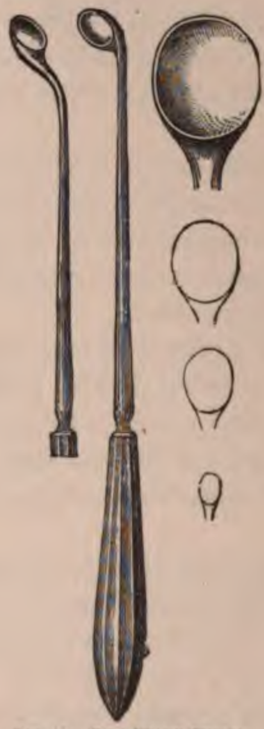


FIG. 97.—THE SHARP SPOON.

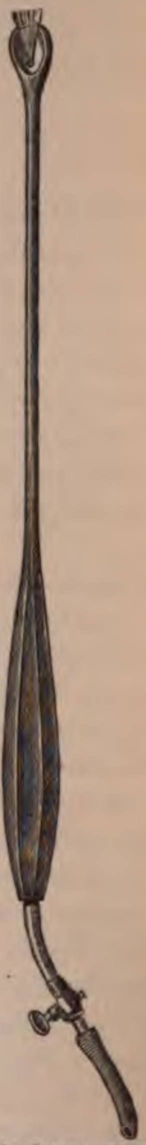
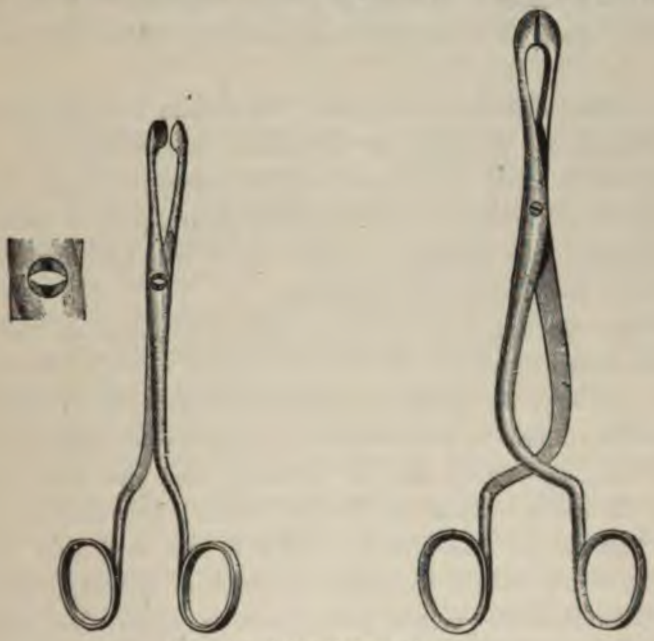


FIG. 98.—THE IRRIGATOR CUR

deed the shape of the finger-nail. Schultze's curette forceps are convenient for the removal of small tumors or projections. If the in ment be constructed, as is mine, so that the blades can be disarticulated, then each blade is itself a curette. These curette forceps are constructed with the cutting edge at the apex or at the sides.

The curette is used either from a diagnostic standpoint for the removal of portions of tissue for microscopic diagnosis, or else for the removal of diseased tissue or masses. Following the use of the curette, which usually can scarcely be called an operation, the knife or the scissors are often resorted to for the more complete removal of growths, or else caustics are applied primarily, for, particularly in case of great infiltration, it is not possible to attack this with the curette, until the hot iron or the potential cautery has been used.



Figs. 99 and 100.—Curette Forceps.

Curetting does not, however, subserve the purpose alone of removal of tissue; it also produces an irritant, traumatic effect, and cleanses the surface for the application of therapeutic agents. For this reason the procedure is resorted to in instances of chronic catarrh, where there exist polypoid and fungous vegetations, or where the mucous membrane is much thickened and altered. Often, also, the curette is called for in case of simple chronic cervical catarrh, either alone or else as a preparatory measure to resort to caustics. Most frequently the curette is used to remove the softer, infiltrated varieties of new growths, such as adenoma, sarcoma, carcinoma. The dull curette is advocated by Mundé, Alloway, Schröder, Fehling, Prochownik and others, for the removal of remnants of an ovum.

Simon in particular showed that in case of non-operable carcinoma the removal of as much as possible of the masses with the curette tended to palliate for a time the chief symptoms, discharge, pain, hemorrhage, and that further careful curetting of all the recognizable cancerous masses would often check for a relatively long period the active extension of the disease

The contra-indications to the use of the curette are: The presence of acute inflammatory processes of the genitals, in particular of the parametrium, and in a less degree chronic inflammatory processes; irritability of the uterus; softness of the uterine musculature, such as exists during the puerperium; the presence of tumors which may have perforated the uterine wall; the existence of pregnancy.

The risks resulting from the use of the curette and of the sharp scoop have often been over stated. Récamier's curette, which we do not highly endorse, has, however, in the hands of the inventor and of Demarquay, perforated the uterus in five instances, but the flexible Sims curette and Simon's scoop, are hardly likely to do this if used with care, where the tissue of the uterus is sound and the instrument is only used as a curette. In case, however, the tissue of the uterus is soft, as during the puerperium, or if the walls of the organ are more or less implicated in the new growths, then the greatest possible care is requisite lest perforation occur into the peritoneal cavity. Of the few reported cases of perforation with Simon's scoop (the cause of the two deaths in the practice of Martinez del Rio is not known to me), in Spiegelberg's case there existed carcinomatous degeneration of the entire thickness of the uterus. Although the result was not fatal, I also perforated the uterus while curetting a rapidly growing vascular sarcoma seated in the posterior wall of the organ. Generally, however, as the result of irritation from the curetting, the organ contracts so forcibly that the curette or scoop creaks as it passes over the surface, even as it would if scraping a bone. The same sound, however, is yielded by new growths which consist of dense, connective-tissue stroma, and also in the cervical catarrh accompanied by hyperplasia of the plicæ, and therefore we cannot feel sure that all masses have been removed when the creaking sound is heard or no more masses are removed.

A necessary postulate for the resort to the operation is the accessibility of the diseased surface to the sight or to the touch. In case of the external genitals, the vagina and the cervix, this condition is fulfilled, seeing that the speculum may be used or the parts are within reach of the finger. The uterine cavity, however, must often be previously dilated by the bloody or non-bloody means. The question as to the necessity of preliminary dilatation depends on the diagnosis and the nature of the requisite manipulation. It is preferable to work with the finger and the curette at the same time, and this is especially requisite in the removal of small tumors at the fundus or tubal openings, or when the curette forceps are used. In the majority of instances of chronic endometritis, however, even though the entire endometrium must be curetted, we are generally able to do so without much dilatation, for it suffices if the curette can pass through the cervical canal. Enough dilatation may be obtained in these instances by the tube which is used for irrigation. Preliminary dilatation may be secured by tents, steel-branched dilators, or by discission. Rules in regard to the choice of these methods cannot be formulated, since they vary with the special nature of the case. Even extensive dilatation of the cervical canal, however, sometimes is not sufficient to enable us to feel the neighborhood of the orifices of the tubes, and yet it is here that vegetations are specially situated. We are then obliged to depend on the sensation communicated by the curette or the sound. If we are unable directly to watch the action of the curette with the finger, then the finger should be placed in the vagina to control the action of the instrument, or in the rectum when the scraping is on the posterior wall, and in the anterior *cul-de-sac* or in the bladder when the anterior wall of the uterus is being curetted. We may thus estimate the thickness of the uterine wall and note the liability to perforation. These procedures have the further advantage that thereby the organ is steadied so that the curette may be used on a firm base.

To use the curette, the bowels and bladder should be emptied and th patient should be caused to assume the dorsal or the lateral position. large disinfectant injection should be administered, or the vagina an uterus may be permanently irrigated during the procedure. Where the is lack of space for the coincident irrigation of the uterine cavity, it should at least be washed out through a return-current catheter, for the purpose of disinfection and of removal of the curetted fragments. By means of the irrigator-curette we can readily attain these aims, only care must be taken that, during the use of the instrument, the supply tube is not twisted or compressed. Curetting may also be resorted to through the Bandl or the short Cusco speculum filled with 5 per cent. carbolic or sublimate solution.

The part to be curetted should be steadied by assistants through tenacula, and drawn down a trifle, and this may often be well accomplished by two fingers in the rectum. Under the guidance of the finger, or else through a speculum, the curette is applied to the desired spot or is inserted into the uterine cavity. In the vagina, straight or slightly curved instruments generally suffice, but for the anterior and the posterior uterine walls the instruments must be sharply curved. The fundus is best curetted by instruments, the cutting part of which is at right angles to the blade.

In case we aim at curetting new growths, large scoops should be chosen at the outset in order to remove quickly the in general vascular growth, such as carcinoma. The curette is drawn backward and forward over the diseased surface wherever the finger has detected alteration, and the manipulation is kept up until the scraping sound tells us that we have reached uterine tissue. After the process is at an end, we should examine again with great care to see if any remnants are still to be removed. If this be the case, then a smaller instrument is inserted and the process repeated. In case we aim purely at curetting the mucous membrane, and the cervical canal, as is usually then the case, is not wide open, then a small instrument should be selected at the outset.

We cannot sufficiently urge practice of curetting on the cadaver or an extirpated uterus, and thus we may ascertain how difficult it is to curette the entire endometrium, and also how likely it is for a portion to be left.

After the curetting has been completed the masses may be removed by the dull curette, and the cavity should then be irrigated.

At the outset hemorrhage is frequently profuse, but when normal uterine tissue is reached it generally ceases. In case, however, as in carcinoma, it has not been possible to remove all the growth, then it may be necessary to check the hemorrhage by injection of liquor ferri, or by the tamponade of the cavity.

When cauterization is indicated this should follow at once on the curetting. In case of chronic catarrh the use of caustics is rarely indicated; indeed, for reasons already dwelt upon, it may be harmful.

In case there is no hemorrhage the tamponade is not requisite. I am in the habit, after drying the cavity, of inserting an iodoform pencil which is held in place by a gently applied iodoform gauze tampon. To favor drainage and to disinfect frequent vaginal douches should be administered.

Only when the curetting is undertaken for diagnostic purposes should it be performed in office practice, very exceptionally at the best. It is ordinarily advisable to keep the patient in bed for six to eight days, although even later, as Prochownik has shown, there may result parametritis or infection, and therefore extra precautions are advisable.

Ordinarily curetting should be performed under anesthesia. In regard to the painfulness of the procedure opinions vary. I have found curetting of the uterus ordinarily very painful. Anesthesia carries with it the advantage that the operator can take his time and can satisfy himself that the procedure has been thoroughly completed.

CHAPTER XXIV.

THE USE OF PESSARIES.

PESSARIES (pessi, vaginal and uterine supports, etc.), were often inserted into the genitals by the earlier gynecologists for the purpose of correcting displacements of the uterus, in particular prolapse, and also, much more frequently, to bring medicinal agents, of which the pessaries were constructed or impregnated, into contact with the mucous membrane of the vagina and of the cervix. Reference to these points will be found in the writings of Busch, Franqué, Simpson and others.

For mechanical purposes, sponges, rolls of linen, nuts, animal bladders (Albucasis) were inserted into the vagina, but the first reference to the instruments we use to-day dates from the time of Ambroise Paré (1573). Since then an incredible number of pessaries have been devised, the greater number of which are purely of historical interest.

It was not till 1820, when changes in the position of the uterus were clearly recognized, that vaginal pessaries were scientifically used, and that Amussat began to treat uterine flexions by the stem, the special orthopedic method applicable to distortions of the uterus, which has excited so much discussion, and is still to-day matter of controversy, the question in dispute being as to whether the symptoms are to be traced to flexion and to version or else to affections complicating them. We do not propose here, however, to discuss the special topic of treatment of uterine displacements, but we are concerned largely with the general rules applicable to pessaries and with the technique of their insertion.

I. Vaginal Pessaries.

The most frequent indication for the use of vaginal pessaries is changes in position, and to a lesser degree in shape of the uterus, that is to say, deviations downwards, forwards, backwards, laterally, flexions, and lastly abnormal movability of the uterus, changes in position of the vagina, rectum, and bladder. Less frequently the pessary is used to cause retention of an intra-uterine stem, to limit the movability of other organs, in particular the ovaries, to correct incontinence of urine (Schatz's *Trichter-pessar*), finally to stretch adhesions by pressure exerted through the instrument.

These indications have their limitations. Aside from the rare instances where the displacement has been cured by the pessary, either as the result of pressure, gangrene and after-shrinking, or because the instrument was inserted in recent cases, as during the puerperium, cures of displacements from the use of pessaries are not so very exceptional, although still infrequent. Often we are able simply to maintain the uterus temporarily in its normal position, and we must be content with lessening the displacement or the amount of flexion; often we cause an opposite displacement. As we will note further on, the use of pessaries is accompanied by a number of disadvantages which it is out of our power to overcome, and the value of pessaries is thence lessened when compared with other procedures. The plastic operations which have of late years been introduced into gynecological practice, the amputation and extirpation of the cervix, colpo-perineorrhaphy, etc., up to the "Guérison par la tenotomie utero-vaginale ignée" of Abeille, these procedures have considerably lessened the need of pessaries, and are able to restore the conditions practically to the normal. In particular is this true of backward displacements of the uterus, and the results will increase the more patients learn not to fear the knife, and the greater the care taken in perfecting the methods of operation and of wound treatment.

Pessaries indeed are purely crutches, as every gynecologist daily finds, and they should only be resorted to when, on the one hand, cure by operation is not possible, and, on the other hand, when the anatomical changes or the functional disturbances produced by the displacement are so great as to outweigh the inconveniences resulting from the wearing of a pessary.

In case of every displacement and alteration in shape of the uterus, the rule holds: Replace the organ or the altered part, and then retain it in position. Retention is secured by the pessary; reposition is attained by the bimanual palpation, exceptionally by the sound or the previously described elevators, to which we must add Wallace's procedure of inserting a curved sponge tent, on dilatation of which the organ is straightened out, a procedure analogous to Schultze's method of intra-uterin straightening after divulsion of the cavity.

There are a number of considerations in regard to the insertion of pessaries from the side of the genital canal and of the patient.

It was formerly believed that the pessaries took purchase on the bony walls of the pelvis. It is very evident that such cannot be the case, because, on the one hand, we can never use large enough pessaries to attain this, and on the other hand, because if we should the functions of the bladder and of the rectum would be interfered with or at least disturbed. Without question the pessaries, in particular the purely internal, are held in place by simple contact with the undistended vaginal walls; additional retention is indirectly yielded by the anterior part of the levator ani, the descending rami of the pubes, the symphysis, and the pelvic floor. In order that a pessary may be retained in the vagina, in addition to the permeability of the canal, there must exist equable distensibility of the vaginal walls. Cicatrices must first be overcome by dilators or by the knife. Similarly, tumors in and external to the vagina often interfere with this distensibility, and occasionally prevent altogether the insertion of a pessary. The vagina further must have its normal curve, approximately at least, and the walls must not be so relaxed as not to allow of a certain amount of stretching. Great prolapse of the vaginal walls, following on laceration of the genital canal and of the perineum, must first be rectified by the rectal or the vaginal suture.

Every pessary acts more or less as a foreign body on the mucous membrane of the vagina, according to the amount of distension it produces. We cannot know beforehand how much the vagina will react against the irritant, and how it will stand distension. There are patients who cannot wear the most accurately adjusted pessary, or else in whom it must be changed, and there are other women who can wear most unsuitable instruments for a long time without damage. In general it may be stated that the tolerance of the vagina varies directly in proportion to its sensitiveness to pressure, and to the extent and degree of an existing inflammation of its mucous membrane. Any disease of the mucosa will inevitably be made worse by the insertion of a pessary, and even where the vaginal walls are healthy, there results almost always catarrh, particularly when careful cleansing of the canal and of the instrument does not obtain. The choice of the pessary as regards size, form, material, etc., is in this connection of great importance. Ordinarily the mistake is made of choosing too large an instrument, one which stretches the vagina overmuch; the examining finger then detects great distension, particularly in the anterior fornix, and the vaginal folds are effaced. The patient soon complains of pain, and of a frequently profuse watery discharge; the functions of the rectum and of the bladder are interfered with; the epithelium is rubbed off the spot where the pessary presses and an ulcer results. The pessary in a very short time causes a depression in the vaginal walls and becomes covered with granulations, or else perforates into a neighboring organ. The choice of a proper pessary is purely a matter of experience and practice, which does not lie within the reach of every physician. The width and distensibility of the vagina may be best accurately determined by careful examination; the so-called vaginometers do not answer, since they only inform us as to the distensibility in one direction. It will often be necessary to insert a pessary, generally a ring, for the purpose of measurement of the amount of allowable distensibility.

There are certain considerations, further, from the side of the uterus. This organ must be movable and replaceable. Only in case of anterior displacement is previous reposition unnecessary; backward and downwards displacements must always be rectified manually or instrumentally, although exceptionally a pessary is inserted in order to stretch adhesions. A further postulate from the side of the uterus is the absence of recent acute inflammatory affections. The general and good rule should be, first modify the inflammatory process, then reposit, and lastly retain the organ. Diseases of the mucous membrane of the cervix should always first be treated, for they are intensified by the use of pessaries, papillary excrescences and erosions readily forming; still we are frequently obliged to insert a pessary in order to modify the disturbances in nutrition, which result from alterations in the circulation which are due to the flexion. The uterus furthermore should not be too heavy; disturbances of nutrition, new growths, especially fibromata in its walls, often render the organ so heavy that the pessary cannot afford the necessary support to hold it in proper position. In case of many displacements, it is further essential that the uterine tissue should be rather dense, or else the fundus will flex over the instrument.

Inflammatory affections of the uterine adnexa contra-indicate the use of pessaries; as also many tumors of the organ, which limit its movabilit Very often, in case of retroversion, it is the enlarged, sensitive ovaries lying in Douglas's fossa, which render it impossible to adjust a pessary.

Pregnancy of itself does not contra-indicate the use of a pessary; on the contrary, one is often inserted in order to render conception possible, to prevent miscarriage, to relieve excessive nausea or other symptoms, apparently dependent on the displacement. We must always take into account, however, the rapid increase in size of the organ, and the resulting insufficiency of the pessary, wherefore it must be frequently changed. Generally pessaries are only used in the early months of pregnancy; as soon as the organ has risen above the brim, the pessary has no further effect on it, and it is then used, if at all, on account of displacement of the vagina.

It goes without saying, that the pessary should not interfere with the function of the genital apparatus, and the neighboring organs; there are displacements, however, which cause such severe symptoms that to relieve them we may feel called upon to interfere with one or another less essential function.

The more complicated the apparatus used, the more likely it is that complications will result, and we should ever, therefore, aim at using simple instruments.

In many instances, and happily they are not rare, the orthopedic treatment gives immediate, often brilliant results; and in many others still the treatment is tedious, requires time and rest on the part of the patient, frequently indeed it eventuates in causing diseases, and this is reason enough, before beginning treatment, for estimating carefully the individuality of the patient, and perhaps then determining not to resort to it.

The choice of a faulty instrument, neglect of the necessary rules, may result in great disadvantage to the patient, even in serious symptoms. The most frequent result of the insertion of a faulty pessary is, as has been stated, pain; then interference with the function of the bladder and the rectum; next, as the result of irritation of the vaginal mucous membrane, there is increased discharge, at the outset watery, and then purulent, bloody, of unpleasant odor; finally, erosion or ulceration of the mucous membrane. The discharge roughens the pessary, and it becomes covered with concretions; on the eroded surfaces granulations form, which spread over the instrument and fix it, or else the vagina is perforated and eventually the bladder or the rectum.

A large number of cases of perforation of the rectum, bladder, or both, have been collected by Busch and Franqué, and also by Schuh, Churton, Hope, Heftler, Buchanan and others. Lüders has recorded an instance of perforation in Douglas's fossa. There are also numerous instances recorded of constriction of the cervix or a portion of the vaginal mucous membrane, as the result of swelling of the parts in the lumen of the instrument. Verneuil witnessed myelitis follow on the wearing of a pessary; Hegar and Kaltenbach noted an instance of development of carcinoma at the site where the instrument pressed. I have latterly myself seen carcinoma develop rapidly from the granulations which had sprouted over an imbedded pessary.

Much more frequently than the above sequelæ do we find instances where the pessary has only partially eroded the vaginal wall, and where granulations and cicatricial bands have grown over the instrument, making its removal very difficult, and necessitating its rupture. Instances of this nature are also recorded by Busch and Franqué, and latterly Burrow, Rokitansky and others, have reported similar ones. We must then incise the cicatricial bands or scrape away the granulations which surround the instrument, or else we must break the latter, as will be mentioned further on. In case a pessary is left *in situ* for years, physiological changes occur in the genitals, which greatly interfere with the removal of the instrument. This happens most frequently in women who have passed the climacteric, in whom the genitals have atrophied, or in whom the vagina has become narrowed from adhesive union between the walls.

When a pessary has been inserted, it should be carefully tested to ascertain if it fits. The patient should be examined while bearing down, and then in the erect position, after she has walked around, lifted heavy objects, etc. Further, the position of the instrument should be tested when the bladder and the rectum are filled and when empty. Since, however, we can never be certain as to whether the pessary will answer or not, the patient should be given strict directions in regard to it. If the pessary be too small, it will slip out of position, and project, particularly on bearing down at stool. If the instrument be too large it ordinarily soon causes pain, discharge, and interferes with the emptying of the bladder and rectum. The patient must be directed to remove the instrument in case it causes symptoms, or, if it only projects on effort, she should be told to push it in place. The patient should always be informed of the fact that a pessary has been inserted. The majority of women can themselves remove without difficulty a simple pessary; they should be informed to bear downwards in the squatting posture, to hook the finger in the instrument and to pull it downwards and backwards. The removal of complicated pessaries requires more skill than the patients possess, and they must be directed to report to the physician.

In case the genitals or their surroundings are sensitive, the patients should remain quiet for awhile, possibly in bed. We are often obliged to increase the tolerance of the vagina by the insertion of tannin and glycerine tampons or of small, soft, elastic pessaries, such as the rings, and thus also to test the sensibility. Indeed the preliminary tamponade of the vagina, which procedure many authorities, Bell for instance, prefer to pessaries, is advantageous, in particular in cases where reposition of the uterus is difficult. At the outset of the treatment patients should be cautioned against hard work, but later they may resume their accustomed habits of life.

A properly fitted pessary should cause the patient no symptoms, and she should be able while wearing it to ride, jump, dance, etc., without the instrument being specially disturbed; indeed instead of causing symptoms the pessary should directly relieve, for the insertion of the instrument frequently is purely symptomatic.

Since, as we have stated, every pessary is more or less of an irritant, and becomes encrusted or at least roughened, it is absolutely essential that cleansing vaginal douches should be administered. Water with the addition of permanganate of potass, carbolic, thymol, etc., may be used. For similar reasons even the most accurately adjusted instrument must be removed and cleansed from time to time. As to the proper intervals for removal no definite statement can be made. Godson saw a case where a pessary had been worn continuously for twenty-six years without damage; it is not, however, by any means advisable to remove the instrument daily, since thus we irritate the genital canal. An exception to this statement is made in case of the intra-uterine stem.

Simple pessaries constructed from hard, non-absorbent, smoothly polished substances, such as hard rubber, silver, aluminium, tin, porcelain, glass, celluloid, etc., may remain longer in the vagina than those with uneven surface and of porous material. Pessaries made from vulcanized rubber and from soft rubber alter very quickly.

A change in the instrument will, however, be necessary, since both the pessary and the vaginal walls may alter their dimensions. We are most frequently obliged quickly to change the larger instruments, since the vagina, as the result of continuous pressure, becomes larger and more relaxed. Changes in the uterus also necessitate the use of a different instrument. In particular at the time of menstruation are the conditions so altered that the pessary must be removed. Menstruation itself is no indication for the removal of the instrument, but only when associated with symptoms which can be laid to the score of the pessary.

Where it is possible it is preferable to give the genitals a few days rest before the re-insertion of the same or of a new instrument. In case profuse discharge, abrasions, or irritability of the mucous membrane is present, this must first be allayed. Attention should be directed to the regular evacuation of the rectum and of the bladder. The greater the collection of fæcal masses in the intestine the greater the liability of change in the position of the instrument and of the occurrence of painful pressure on the uterus.

Pessaries are divided into two classes, those which are purely internal vaginal, and those which are held in place by some external attachment.

The first vagino-abdominal pessary was devised by Roonhuysen in 1663, and since many forms have been invented by Ströhlin, Camper, Seidele, Stein, Zingerle, Kniphof, Zeller, Hunold, Schmidt, Villermé, Romero y Linares, Saviard, Récamier, Clay, Mayer and many others. The majority of these were in principle so devised as to be retained in the vagina by one or many bands passing between the thighs and then attached to an abdominal binder. They were round, pear-shaped, or disk-like, attached to a blade which diverged into two or more. All these pessaries, which were in general use in case of prolapse of the uterus and the vagina, have the disadvantage that not only the vagina, but also the introitus is irritated by the stem of the pessary, and that the freedom of motion of the patient is interfered with. Coitus is practically interfered with, and in assuming the sitting posture the uterus and the vagina may be dislocated or injured.

Many of these vagino-abdominal pessaries, like those of Mouremans, Clay, Mayer, Kiwisch, Roser and Scanzoni, Breslau, Lazarewitsch, Seyfert, Babcock and others, are more or less firmly attached to a pel girdle. These pessaries are only of utility when the vagina is widely di tended and relaxed, so that an internal instrument can find no support in the vagina. The Roser-Scanzoni apparatus consists of a pear-shaped body, the width of the vagina, which is connected by means of a U-shaped metal blade with a pad which is fixed above the symphysis by a pelvic girdle. The uterus is replaced, the pear-shaped body is inserted into the vagina and the metal blade is next connected with the pad, by means of a piece of rubber tubing.

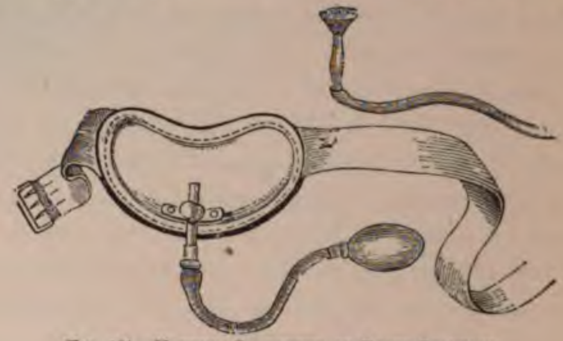


FIG. 101.—UTERINE SUPPORTER OF ROSER-SCANZONI.

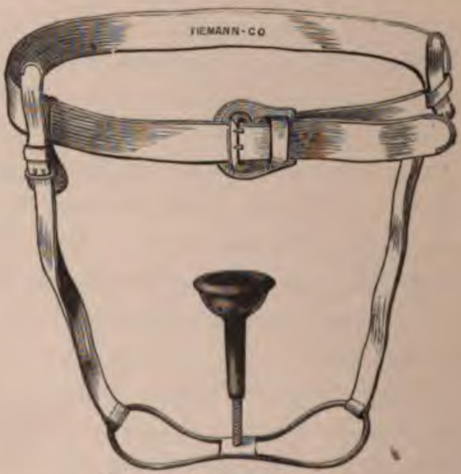


FIG. 102.—SCANZONI'S PESSARY.

In case of greater relaxation of the vagina with prolapse of the posterior vaginal wall, Scanzoni devised a second apparatus, consisting of a cylindrical pessary attached to a simple pelvic girdle (Fig. 102).

The rounded pessary, constructed of wood, horn or rubber, is about an inch thick, and its stem about two and three-quarter inches long, and it is fitted in a ball-and-socket joint. This joint is attached to a band which passes between the thighs of the patient, and is connected in front and behind to a pelvic girdle. To insert the pessary, one end of the band is loosened from the girdle, the ball is placed in the vagina in its socket, and the band is re-attached. With this apparatus, and all the more so with the others, it is essential to test a number, and to change the length of the stem until the pessary fits accurately.

Many patients complain of the pressure of the band in the anal fold, and this may be obviated by dividing it into two diverging portions, which are attached to the sides of the pelvic girdle. To a similar apparatus round pessaries may also be affixed, and in order to ensure movability on the part of the pessary, the end of the stem where it projects from the vagina, may be converted into a ball-and-socket joint, which lies against a simple T-bandage, to guard against the instrument falling out.

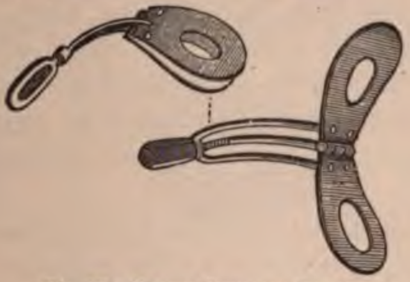


FIG. 103.—ZWANCK-SCHILLING PESSARY.

There are in addition other pessaries, the stem of which does not subserve the purpose of maintaining the pessary in place, but which obtain their support by transverse distension of the vagina. Breslau has described an apparatus of this nature which was devised at the beginning of this century, and Kilian's *elythromochlion* was based upon the same principle, consisting of a U-shaped steel spring, which in expanding distended the vagina transversely. About thirty years ago Zwanck devised a hysterophore, which has been extensively used as modified by Schilling and by Eulenburg, and which is known as the Zwanck-Schilling pessary (Fig. 103). This instrument consists of two perforated, crescentic or oval wings of metal, horn, or rubber, which are connected by a hinge joint so as to close together. These wings are opened and shut by means of a screw stem. After reposition of the uterus these pessaries are inserted into the vagina closed, and the wings are then separated by turning the screw until the distension of the vaginal walls is sufficient to maintain the instrument in position.

These wing-shaped hysterophores have been recommended by the most distinguished gynecologists, such as Mayer, Mikschik, Franqué and others, and they are still used by physicians who do not possess the skill requisite for the adaptation of a proper pessary. They are all open to objections, however, for owing to the complexity of their construction, it is difficult to keep them clean; they irritate the vaginal walls and the cervix more than all other instruments; they readily slip from position, and the wings by pressure on the vaginal walls often lead to inflammatory processes, to gangrene, and even to perforation (Beigel, Heftler, Churton, Hope, Buchanan, Hegar and Kåltenbach, Galabin, Habit, Pagenstecher and others). I have repeatedly removed these winged pessaries, where deep abrasions had been made in the vagina, and I have observed a case where the wings of the instrument had perforated the vagina and the rectum totally, and the fæces were passed through the opening in the wing which lay in the vagina.

The internal pessaries take purchase from the vagina and the cervix. They are, in general, far better and less likely to cause irritation than the vagino-abdominal, and should always be used in preference whenever there is sufficient support to allow it. Even when the vagina is distended and relaxed, and the curve of the canal and the resistance of the pelvic floor is lost, and there exists an extreme degree of prolapse of the vagina with cystocele and rectocele, it is not always essential to use a vagino-abdominal pessary, but the purely internal may still be retained in the vagina by applying a T-bandage with a perineal cushion, which presses the introitus vaginæ from behind forwards, and re-enforces partially the pelvic floor.

The older internal pessaries were disc-like, cylindrical, round, oval, pear-shaped, and were either solid or perforated. Such instruments were devised by A. Paré, Hildanus, Heister, Roonhuysen, Brüninghausen, Mauriceau, Chapman, Warrington, Levret and others, but they have been forgotten, even as have also the great majority of more recently devised instruments. To-day in the correct endeavor to use simple instruments, we resort only to a few somewhat similar in construction, and of these we will here speak.

Simple, closed or open, round or oval pessaries (the latter readily slip out), have been devised by C. Mayer, Martin, Hegar and Kaltenbach, C. and G. Braun, and others, and are recommended in particular in cases of prolapse of the uterus and the vagina. These rings have either a central or an eccentric opening (*pessaire à contraversion*, Martin), which is intended for the reception of the cervix. In this category belongs the flat, cradle-shaped pessary of Fritsch ("querriegel").

The rings constructed of linen filled with hair and covered with rubber, still to be found in the shops, are to be rejected. They quickly become rough and irritate the mucous membrane, and furthermore the central opening is in general too small. Those made of box-wood, horn, tin, copper or silver-plated, are preferable. Aluminium is without question the best material for pessaries, although partially on account of its price, and partially owing to the difficulty of working it (and this is being lessened daily), hard rubber is the most frequently used material. It can be shaped readily, scarcely alters at all, is not attacked by the vaginal secretions, and may be polished smoothly. Rubber rings, if thick, are, however, heavy, and it is preferable to have them made hollow, as C. Braun has recommended, and then they are light enough to float in water. Furthermore their volume may then be increased, a point on which sufficient stress cannot be laid, since with the thickness of the instrument there is greater contact with the vaginal walls, and, therefore, there is less likelihood of their slipping out, or their cutting into the mucous membrane. The surface of these rings should be carefully inspected to see if the polish is thorough, for during the process of hardening of the ring a small opening may have formed, which has been only superficially closed. If such a ring be placed in the vagina, the polish wears off, secretion enters the opening into the cavity of the pessary, where it stagnates, smells foul, and irritates the vaginal mucous membrane.

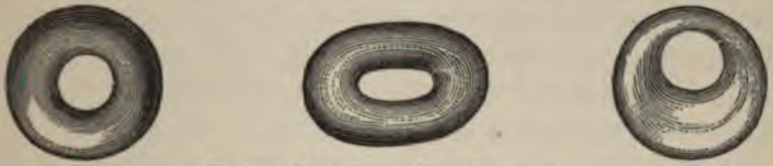


FIG. 104.—HARD RUBBER RING PESSARIES.

Either open or closed rings are used (Pauli and others inserted two rings), and the first are recommended in that they make no pressure on the neck of the bladder, and are so inserted that their open ends lie to each side of the vesical neck. In case thin, open rings are used, however, there is risk lest the vagina be injured and perforated by the extremities. The thicker rings are not open to this objection, but still the instrument always turns so that the opening no longer corresponds to the vesical neck, and, therefore, the advantage is lost. This tendency to rotation is why the rings with central opening are preferable to those recommended by Martin with eccentric opening.

In order that in case of great narrowness of the introitus vaginæ ring pessaries may be inserted, which will answer fairly well, C. Mayer has recommended elastic rubber rings, and since then many such elastic pessaries have been devised. The rings originally used by Mayer were made of solid vulcanized rubber, and were very heavy. Those constructed of porous rubber with a thin layer of vulcanite, or those of black soft rubber, are preferable. We may also use rings containing a compressible spring, like those of Meigs. The rings made of vulcanized rubber soon become foul and irritate the vagina, whence they should be changed every few days, in order to be cleansed. Black rubber is much more lasting, although they should never be left in the vagina longer than two to three weeks without change.

Gariel has devised an air pessary, an inflated rubber bag, and since various cylindrical pessaries of this nature have been used. These are either first inflated, or else they carry an attached tube through which they are inflated after insertion into the vagina. These air pessaries, also, are not durable; they soon acquire a foul odor, lose their elasticity through the escape of the air, so that it is necessary to change them frequently.

The simple ring pessaries are not only used in case of abnormal movability, descent and prolapse of the uterus, and of the vaginal walls, but also in case of versions and flexions of the uterus, in particular when the vaginal walls are very much relaxed. These instruments fix the cervix near the mid-line by stretching the *cul-de-sac*, and the thick body of the ring prevents the deviation of the cervix in one or another direction. They do not, however, permit of marked retroposition of the cervix, and, therefore, the pessaries which we will describe later are preferable to the rings. In cases of sterility dependent on abnormal curvature due to excessive length of the vagina, these rings have often rendered me good service.

To insert these ring pessaries the patient may occupy either the lateral or the dorsal position. The introitus vaginæ is opened up transversely by the fingers of one hand, the hair is carefully pushed away, and the ring, anointed with glycerine, soap and water, fat, vaseline, is inserted obliquely into the vagina, avoiding pressure on the sensitive urethral bulb.

When the greatest circumference of the instrument has passed the introitus, the ring often slips of itself into the correct position. In case this does not happen then it must be adjusted so as to include the cervix in its lumen. If the pessary, as often happens, has glided into the anterior fornix, then the finger is inserted at the posterior border of the instrument, and it is carried behind the cervix.

Elastic and compressible rings may readily be inserted even in case of very narrow introitus. They are simply compressed into an oval and inserted like the previous instruments. In order to insert these instruments with the infliction of the least possible pain on the patient, Fritsch has devised a special pessary forceps for grasping them.

When the ring is properly placed, it lies in a plane practically at right angles with the axis of the cervix.

Thick rings should by preference be chosen, but the opening in them should be large enough to permit of motion on the part of the cervix. In case the opening in the ring is too small, then either the cervix will not enter it, or else at the time of menstruation in particular it will become strangulated. If, on the other hand, the lumen is too large, then the uterus together with the vaginal walls will sink into it. The prolapsed uterus has a constant tendency to sink, notwithstanding the presence of the pessary, as is proved by the lengthening of the cervix, and by the eversion of its lips. We frequently witness, too, large and dense cervices becoming soft and succulent, after the protracted wearing of a pessary, and this does not only depend on the equalization of the circulation in the uterus, but also on the pressure exerted by the pessary.

Latterly Breisky has advocated in case of chronic prolapse the egg-shaped pessary, and has had them constructed of hard rubber in various sizes, and when they are well borne they prove very efficient. To remove these pessaries Breisky used metal or wire forceps, shaped like obstetrical.

After the ring pessaries the Hodge lever is recommended and used by Schröder, Scanzoni, Spiegelberg, C. and G. Braun, Winckel, Hueter, Coghill, Gervis, Hermann, Cocks, Trenholme and others. These pessaries are either slightly S-shaped or cradle-shaped; they are either closed or else open in front, although the latter are not to be commended, since the open extremities very readily may perforate the anterior vaginal wall. When these instruments were devised sixty years ago, they were wrongly supposed to act on a lever principle, and were called lever pessaries. Hueter, Martin and others, have dispelled this illusion, and have called them lifting pessaries. The action of these pessaries, even as with the rings, depends on the stretching of the vaginal walls antero-posteriorly, whereby the cervix is slightly fixed in the median line; they also work secondarily in that they prevent the body of the uterus from falling backwards or forwards. In a measure then these pessaries have a lever action, although they do not act as such, but the uterus forms the lever with the fixed point as the insertion of the vaginal walls.

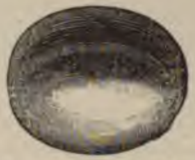


FIG. 105.—BREISKY EGG-PESSARY.

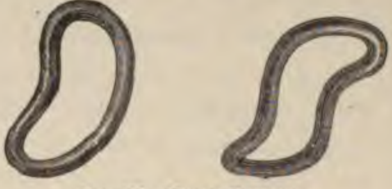


FIG. 106.—HODGE PESSARY.

The simple Hodge is useful in case of version and flexion of the uterus, less frequently in case of prolapse. They are good retention instruments, but they only lessen the pathological condition; they do not, however, cause the uterus to maintain a normal position.

These pessaries are constructed of horn, wood, zinc, aluminium, lead with a covering of celluloid, or, and most frequently, of hard rubber. Pessaries of this material may be softened in hot water or over an alcohol lamp, so that the requisite shape may be given them, but we must be careful not to crack the instrument, and to hold it in the desired shape until it has cooled.

The selection and the fitting of these pessaries, as regards length, breadth, curvature of one or another extremity, require generally great patience on the part of the physician and the patient, since frequently very slight changes are necessary in order to adapt the instrument perfectly. In order to attain our aim, we may not only use malleable pessaries, to obtain a model, but also resort for permanent use to pessaries, such as have been devised by Sims, Halbertsma, Schultze, Prochownik and others. Sims shaped pessaries from block tin, Halbertsma and Schultze from copper wire covered with rubber or gutta-percha. The gutta-percha covering is without comparison inferior to the rubber, since after a while it breaks off. The solid metal pessaries are too heavy, and the English hollow tin rings are preferable. In case the genitals are very sensitive, the pessaries which are elastic are to be commended.

In case of anteversion this pessary is inserted so that the broad end lies in front and is directed upwards, the narrower end lying behind and being directed downwards. The pessary lies as nearly as possible on a level, but it does not maintain this position. It sinks to one or another side, but still stretches the vagina properly and fixes the cervix. If, in addition to the anteversion, there is lateral displacement or curvature, then the pessary is curved a little more on the corresponding side, and the uterus is thus supported a trifle.

In case of retroversion, where generally there is coincident relaxation of the pelvic floor, the pessary is inserted so that the greater curvature lies posteriorly, and the point presses on the floor of the pelvis.

This instrument is introduced in a similar manner to the ring. It is inserted in the vertical diameter of the introitus vaginæ, and the proper bar is carried by the finger behind the cervix, so that the organ occupies the lumen of the instrument.

Of the great number of instruments constructed on the principle of the Hodge, there are only a few which may be used to advantage in special varieties of uterine displacements. Graily Hewitt has devised a number of pessaries, which sufficiently maintain the uterus in position when the vagina is much relaxed, the introitus is very wide, and there exists coincident displacement of the anterior vaginal wall. All the earlier pessaries, the rings as well as the Hodge, are displaced by the downward sagging of the anterior wall of the vagina. The anterior part of the instruments is pressed downwards, sinks forward and out of the vagina. In these cases the cradle pessary of Graily Hewitt answers well. It consists essentially of two oval rings, which are curved slightly on the flat, and are united together at about a right angle; afterwards Graily Hewitt inserted a cross-piece at the junction of the branches of the pessary. One of these rings is intended to receive the cervix, and the other rests against the anterior vaginal wall, the pessary being so inserted that its open angle looks backwards and downwards. The more relaxed the parts the larger and wider must the anterior portion of the pessary be. This form of pessary may also be used in case of retroversion, since it takes greater purchase in the vagina than the previously described forms.

For retroversion Graily Hewitt has also devised pessaries, the posterior bar of which is thickened, but they are in every respect inferior to the Schultze instrument, which will shortly be described.

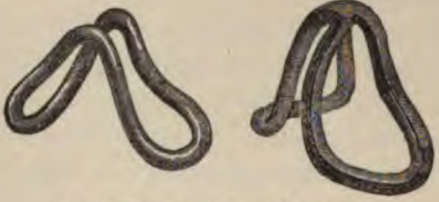


FIG. 107.—GRAILY HEWITT CRADLE PESSARIES.

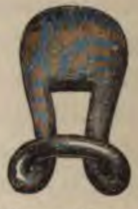


FIG. 108.—HEWITT RETROVERSION PESSARY.

In order to prevent rotation of the pessary in the vagina, the same gentleman has adapted to the Hodge instrument, at the anterior extremity, a solid tongue-like process which in part projects from the vagina. In addition to these pessaries, a number of variously constructed instruments have been devised by Scattergood, Galabin, Kinloch, Chamberlain and many others.

The pessary devised by Graily Hewitt for retroversion has the advantage of filling the posterior *cul-de-sac*, and thereby preventing backward sinking of the body of the uterus. It, however, is only available for lessening the displacement of the uterus. In order to cause complete rectification of the displacement and to overcome the action of the intra-abdominal pressure, Schultze, in 1872, devised two varieties of pessaries, which answer well the purpose of correcting the retro-displacement, and further fulfill the aim of an extra-uterine apparatus, that is to say, the cervix is fixed backward in the pelvis so that the body of the uterus cannot sink below it, and yet the vagina is not distended overmuch in the transverse direction. The first of his pessaries is a figure of eight in shape, and is constructed of copper wire covered with rubber. One of the circulars is for the reception of the cervix, and is shaped according to the size of the organ; the other, the larger, takes purchase on the pelvic floor, or indirectly on the pubes. The curve of the circulars must be carefully adapted to the uterus and the vagina, and the pessary ordinarily has an S-curvature. The anterior part of the eight may also be bent into a sling, which hangs from the vulva, and gives the patient an excellent means of removal and for insertion of the instrument. Since in case of tense, narrow vagina, it is essential that the cervix be fixed, and the deep projection of the anterior circular carries with it so many disadvantages, that I use by preference Schultze's second form of pessary more frequently.

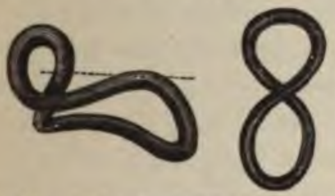


FIG. 109.—SCHULTZE'S FIGURE OF EIGHT PESSARY.

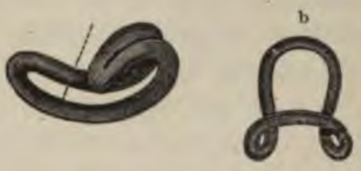


FIG. 110.—SCHULTZE'S PESSARY.

The second form (the sleigh pessary) is curved as in Fig. 110. The larger, broader end lies in the posterior *cul-de-sac*, the anterior sharply-curved extremity presses against the cervix, and fixes it backwards. The curved bars of the pessary press forward on the rami of the pubes. Schultze recommends this instrument above the former in cases where the vagina is relaxed and the cervix is short, since the organ would readily slip out of the first form. The second takes better purchase in the vagina, and holds up to better advantage the prolapsed vaginal walls. In cases of descent of the retroverted uterus, these pessaries retain the organ very well; where there is sagging of the vaginal walls, the instrument must be made broader (as in *b*). If we take care to select a suitable instrument of this type, then it is generally worn without trouble, intercourse is not interfered with, as it is when the figure of eight pessary is inserted, and the displacement of the uterus is unquestionably better rectified than by any of the previously described instruments.

The idea of maintaining the cervix in retroposition is fulfilled also, by Veuillet's instrument, devised in 1871, the anterior part of which is curved to correspond to the convexity of the anterior uterine wall. In 1869 I used a similar instrument in case of retroversion (Fig. 112.)

In all these instruments we must not only see that the curved portion has the proper dimensions, but that the distance between the larger and lesser curvature is considerably greater than the thickness of the uterus.

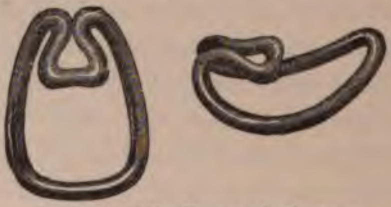


FIG. 111.—VEUILLET'S PESSARY.

The uterine wall does not press upon the anterior border of the curved portion, but rather on the side bars which enter into its formation. In case the curvature of the pessary is too great, and the space between the two curvatures too small, then the cervix is compressed, the circulation is interfered with, the os gapes, there results eversion, and the anterior uterine wall is indented to a greater or less degree where the anterior border of the curved portion rested.

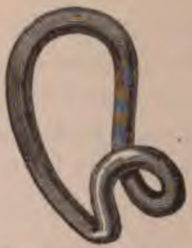


FIG. 112.—CHROBAK'S PESSARY FOR RETROVERSION.

The insertion of these pessaries is more difficult than that of the others. Veuillet inserted his instrument with the patient in the knee-chest position, by means of a long dressing-forceps, and instead of this the instrument devised by Sims for grasping pessaries may be used. In case the introitus vaginæ is wide, then, after reposition of the uterus, the pessary is inserted by the hand, so that first one side of the curved portion, then the anterior part, and then the other side is placed in the vagina, and lastly the pessary is adjusted so that the greater curve is behind, and the lesser in front of the cervix. It is more painful to the patient when the posterior is inserted first, and it tends always to glide into the anterior fornix, and when we endeavor to prevent this by hooking a finger on this border, and placing it behind the cervix, then the anterior extremity catches at the symphysis, and must be depressed by the thumb.

Before the removal of any pessary, the vagina should be irrigated with some disinfecting fluid. All pessaries with an opening receive the cervix within this, and straight traction, in the axis of the vagina, exerted on the pessary, necessarily causes great dislocation of the cervix. The pessary hence must be drawn down until it is released, or else it may be removed sideways. To remove the Hodge pessary, the finger is hooked from below upwards on the anterior bar, and traction is made upon it in about a right angle; then it is removed vertically from the vagina. Where the pessary is thick, in particular with the ring pessaries, it may be difficult to hook the finger in, since there is not sufficient space between the instrument and the cervix. Then the instrument must either be pushed down with the finger, or else it may be pulled down by a broad, smooth hook. When the ring has been detached from the cervix, it is turned in the vertical diameter and rolled out of the vagina. The same remarks apply to the removal of the complicated instruments, only we must bear in mind the shape of the instrument, but this we cannot know unless we have ourselves inserted the pessary.

When the pessary has been removed, then by the touch and through the speculum, we search carefully for erosions and ulcerations, and where necessary institute the therapeutic measures we have already laid stress upon. As for the position of the uterus we must remember that the organ often maintains for hours or days the one in which it was held by the pessary.

It is difficult and may be dangerous to remove a pessary which has grown into the vagina, and is surrounded by granulations and organized bands which have sprouted through its lumen. Narrowing or adhesive union of the vagina below the pessary also renders removal of the instrument a difficult matter. Divulsion of the stenosis or cutting of the adhesions often lead to profuse hemorrhage, and there is danger of septic infection at the site of these fresh wounds, through the vaginal secretio

In case we are obliged to resort to such measures, then most careful disinfection is a pre-requisite. Where possible it is preferable to break up the pessary in the vagina and to remove it piecemeal. For this purpose the instrument is pulled down strongly and the lower border is cut through with wire scissors, chain-saw, or other instrument. The pessary is then turned around a half-circle and cut at the opposed portion. The halves of the instrument are then readily extracted from the vagina with the finger or the forceps.

II. Intra-uterine Pessaries.

Aetius and Galenus were in the habit of treating displacements of the uterus by means of the finger and of the sound, but the steps of the method are not known to us. Winckel says that Möller, in 1803, was the first to raise up and hold the flexed uterus straight by means of a force acting within the organ. He used for this purpose an elastic catheter or tube, through which a differently curved wire was passed, a procedure which has latterly been readvocated by Hertzka.

It would seem as if Amussat, in the year 1826, was the first to practice the insertion of a stem into the uterus in order to straighten out a flexion and to maintain the organ in the desired shape. It was not until twenty years thereafter that the intra-uterine orthopedic treatment received recognition, when Simpson, Valleix and Kiwisch, at about the same time, presented their instruments and reported the results they had obtained from their use.

It is seldom that there has been so much discussion in regard to the worth of a therapeutic method as there has in connection with the use of the intra-uterine stem. Since the first expression of opinion at the Paris Academy of Medicine, in 1854, gynecologists have been divided into two parties, and even to-day there is no unanimity of opinion, some highly praising the stem, others absolutely rejecting it; indeed in one and the same case two distinguished authorities have claimed that the opposite views were each proved. (Winckel, Spiegelberg.) Between the partisans of the stem (Amussat, Simpson, Lee, Valleix, Gaussail, Velpeau, Kiwisch, C. Mayer, Detschy, E. Martin, Veit, Olshausen, Hildebrandt, Haartmann, Winckel, Schröder, M. Sims, Hennig, Kristeller, Graily Hewitt, Priestley, Savage, Greenhalgh, Beatty, Courty, Weber, Amann, Grenser, Benicke, Beigel, Bantock, Chambers, Rigby, Atthill, Routh, Körner, Goodell, A. Martin, Coghill, etc.), and the opponents (Depaul, Raciborsky, Piorry, Gibert, Amussat (later), Cazeaux, Scanzoni, Hueter, Hohl, C. Braun, Seyfert, Credé, Freund, Spiegelberg, Späth, Habit, Retzius, Tilt, Meadows, Oldham, Benett, West, M. Duncan, Tari, Peaslee, etc.), there is a mean group (Schultze, Hegar and Kaltenbach, G. Braun, Thomas, Frankenhäuser, Fritsch and others), who do not fully reject the stem, but only very exceptionally use it at all, even as was claimed for the instrument by Robert and Huguier during the discussion before the Paris Academy.

It is but fair that I should state my own impression in regard to this controversy. In 1870 I reported a case of cure of retroflexion of the uterus, accompanied by respiratory neurosis, by means of the intra-uterine stem, and since that time I have been unable to entirely reject the stem, but have used it in a number of instances of flexion, amenorrhea, torpor of the uterus. Except in the first case I have uniformly used the simple stem, very rarely the one attached to a Hodge or a Schultze figure of eight. In about 8000 cases I have used the stem fully as often as forty times. Only in the first case, where the ultimate result was a complete success, did there develop a parametritis; in all the others there were symptoms of irritability, such as profuse discharge, hemorrhage. I have never been able to note a permanent cure except in the first case, although there was relief of the dysmenorrhea, amenorrhea, and a cessation of the migraine, and other symptoms—a cessation, however, which generally only lasted while the stem was worn. Last year I again had the opportunity of seeing the good effect of an intra-uterine stem, inserted in a case of flexion, on a bronchial asthma which disappeared during the wearing of the stem, only to reappear on its removal. All other method of treatment had failed.

Since, in the small number of instances in which I have tested the stem, I have not obtained better results than in those treated without it, I have more and more limited the cases in which I deem it useful, although when carefully watched I do not consider it a specially dangerous instrument. I believe it to be an agent for use only in those instances where other means have been tried without avail, and where the severity of the symptoms justifies resort to a method which is not entirely free from danger.

The essential part of every intra-uterine pessary is the stem which is intended for insertion into the cavity of the uterus in order to keep the organ straight. In order to maintain the stem in position and for ease of withdrawal the earlier instruments were attached to a handle which was fastened outside of the vagina (Valleix, Kiwisch, Kilian), or else the stem was split so that the halves spread apart (Kiwisch, C. Mayer, Wright, Greenhalgh, Chambers, Bantock). Beresford advocated passing two needles to hold the stem in position. All these methods, however, are to be rejected as dangerous, since they cause pressure on the inner surface of the uterus and irritate the organ, while the first-mentioned means exposes it to injury during sitting, riding, etc. It is not astonishing that in the majority of instances where damage was inflicted on the uterus, such faulty instruments were used. According to Winckel, after the use of Kiwisch's instrument, Scanzoni, Haartmann, C. Mayer, Riese, witnessed severe attacks of peritonitis and deaths; after Greenhalgh's dividing stem, there occurred a death; and after Valleix's instrument Aran, Nélaton, Cruveilhier, witnessed fatal cases. In a case of Haartmann's the wall of the uterus was cut almost through from pressure by the blade of the instrument. The frequently recommended instrument of Detschy is no better, the stem of which is attached to a Zwanck pessary, forming the continuation of the long axis of the pessary.

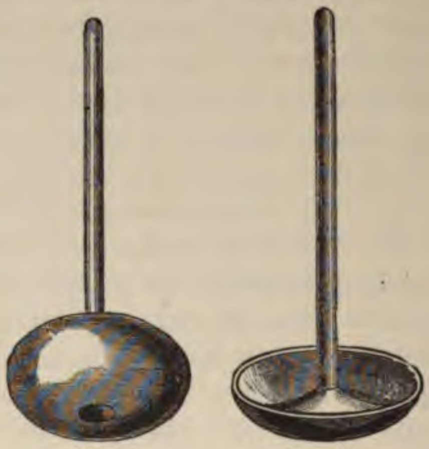


FIG. 113. FIG. 114.

FIGS. 113, 114.—STEM PESSARIES.

The simplest intra-uterine pessary, called by Martin "simple regulator," is Amussat's ivory stem. The stem must be from one-quarter to one-half an inch less in length than the depth of the uterine cavity, otherwise it will touch the fundus and injure the organ, but it must also reach at least three-quarters of an inch above the internal os, else it will not be effective in straightening out the uterus. The thickness of the cylindrical or conical stem should vary according to the width of the internal os; too slender stems readily slip out, while if they are too thick it is difficult to insert them and they ordinarily cause sharp pain. The stem may be either solid or hollow; in any event the extremity within the uterus must be well rounded, and the entire surface must be smooth and carefully polished. The hollow stems, which permit the free outflow of the uterine secretions, since the entire instrument is slender, necessarily have thin walls, and therefore readily break in the vagina. At the

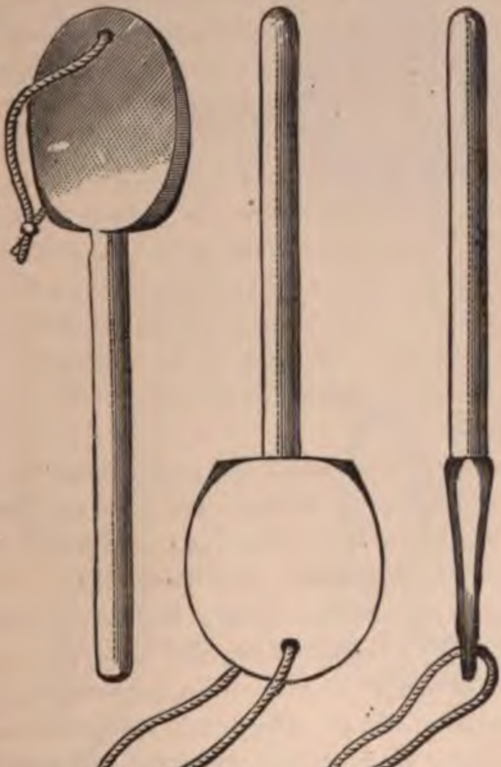


FIG. 115.—AMANN'S PESSARIES.

external, non-uterine extremity of the stem there is a concavo-conve round, slender cup, a thick knob or a ball, which answers the purpose steadying the stem. The diameter of this cup is at least three-quarte of an inch, ordinarily a trifle more, the greater indeed the wider the e ternal os and the more relaxed the tissue of the uterus. The chief util of this cup is to prevent the stem from slipping into the cavity of t uterus, and it further prevents the stem from slipping out, since it re against the vaginal wall and indirectly against the levator ani (Hil brandt), or else is supported by one or another of the means to be m tioned later. Flat cups and round knobs do not maintain the stem position as well as those which are concave upwards, that is, towards the uterus, and I have had them constructed after a plaster cast of the vagi a procedure which Fritsch also favors. In order to maintain the ute better in position Amann, and Eklund as well, have substituted for the cup a trowel-like body. It is of advantage to have a depression in the cup or knob which serves the purpose of allowing the insertion of a sound for guiding the instrument into position, but it should be remembered that when this opening is central the strength of the stem suffers considerable diminution.

As for the material from which the simple stems or regulators are constructed, the first, that of Amussat, was made from ivory. Martin had the knob made of wood; Olshausen used horn for the stem, cork for the knob; Byford had the instrument constructed of elm-wood; C. Braun, who no longer uses the intra-uterine stem, G. Braun, Schröder, Amann, Beigel, and before them Simpson, used hard rubber; Simpson also used, with reference in particular to amenorrhea, pessaries made of zinc and copper; Hildebrandt, Amann, Noeggerath, recommended lead stems; Chadwick a malleable stem; Morris, Meadows, Saltzmann, used glass. The stem should above all be unchangeable and light. Hard rubber is, therefore, a good substance, and the stems may also be made of silver or copper, or gold-plated, and these are light, being hollow, and the cup may be very thin. For a number of years I have used aluminium almost without exception.

In case of anteflexion, where the vagina is not specially relaxed, the simple stems remain quite well in the uterus; but where the uterus and vagina are relaxed, and in case of retroversio-flexio the stems generally slip out to such an extent that the extremity of the stem lies below the internal os, and the instrument, therefore, not only does not subserve its purpose, but the stem, lying in the cervical canal and forming a lever of the second class with the fulcrum at the external os, will irritate or injure the organ. This is one of the objections which Spiegelberg had to the intra-uterine stem.

In order to guard against the slipping out of the stem, Graily Hewitt, Hildebrandt, Winckel, place under the cup of the stem vaginal pessaries, generally rings or rubber inflated pessaries. Schröder and Amann tamponed the vagina with cotton, or else the stem may at the outset be fastened to the vaginal pessary. Winckel tied the stem to a ring pessary; Simpson, and later E. Martin, adapted the stem by a movable joint with the pessary, and Martin called his instrument a movable regulator. Jor-

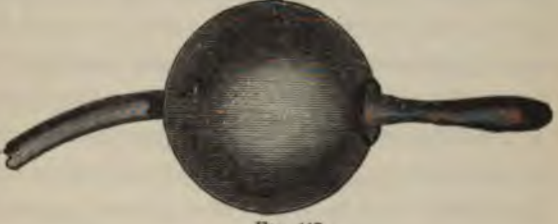


FIG. 117.

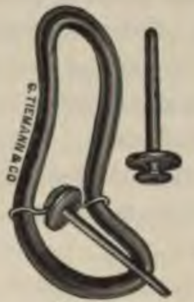


FIG. 118.

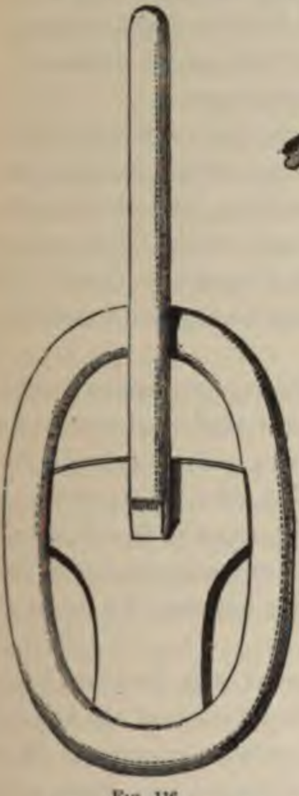


FIG. 116.

FIG. 116.—MARTIN'S REGULATOR. FIG. 117.—BEIGEL'S STEM PESSARY.

FIG. 118.—KINLOCH'S STEM PESSARY

dan and Beigel fastened the stem to an air pessary which was inflated in the vagina; Kinloch places a double rubber band over a Hodge pessary, and the stem rests on this band. Graily Hewitt and Schultze have placed a cross-bar on a Hodge pessary, to support the stem, which is attached to the bar by a movable joint.

The air pessaries cannot remain long in the vagina, for the air escapes, they become rough and foul-smelling, irritate the vagina, and their connection with the stems loosens. Simpson's and Martin's elastic regulators are so firmly attached to the pessary, that the stem readily irritates the uterus and prevents the normal movements of the organ.

The insertion of tampons is unquestionably the best method of retaining the stem in position, but this method is open to the objection that the patient must be kept under constant supervision, since the tampons must be changed every twenty-four to forty-eight hours. This applies also to tampons which are impregnated with glycerine or tannin and glycerine. Iodoform gauze, on the other hand, may remain *in situ* for four to six days.

To fix the stem is not, however, the only object of the procedures we have mentioned The stem straightens the flexed uterus and also causes a version, and in order to overcome this version and to maintain the organ in good position, other instruments are needed. This refers in particular to retroflexions. The pessary is then inserted so that its extra-uterine end points backwards, and thus the uterus is anteverted, and the organ is steadied, as is Schultze's custom, by the insertion of a figure of eight pessary.

The indications for resort to the intra-uterine stem have not been distinctly formulated even by its partisans. Pure flexions of the uterus, forwards, backwards, laterally, are the most common indications. The best results are obtained in case of congenital flexions of high grade, and they are not so good in case of women who have borne children, or in whom the flexion is acquired. Simple, uncomplicated curvatures only exceptionally call for the intra-uterine stem, although Schultze claims that every case of retroversio-flexio in which, on account of the retroposition of the cervix, the body of the uterus flexes backward, calls for intra-uterine orthopedic treatment

Huguier has also used the intra-uterine stem in case of amenorrhea; Simpson aimed at the same end in the use of his electric pessary, and in this connection I would state that we often meet with tolerant uteri, which stand the irritation of the stem very well, and in many instances the use of the stem for weeks has resulted in causing the recurrence of a typical hemorrhage from the uterus. In these instances I have used slender, light, metal stems with concave cup. In cases of lack of sexual desire, which is often associated with amenorrhea and faulty development of the genital organs, my results from the stem have been without exception negative.

In addition to the above indications, intra-uterine pessaries are recommended in case of reflex neuroses, of stenosis of the cervical canal, where the Fritsch knob-stem answers well, and finally, in case of sterility. In this latter respect Martin has had a number of good results, Amann in nine to sixteen instances, Winckel has not succeeded as well. The latter has seen conception follow once and Olshausen twice while the patients were wearing the stem. It should further be stated that Fehling, Ahlfeld and others, resort to the stem for the purpose of drainage in case of uterine catarrh.

It is not possible to state definitely the unfavorable results which have followed resort to the stem, and which have served the purpose of condemnation of the orthopedic intra-uterine treatment. The frequent severe diseases and deaths which formerly occurred (in 1870 Hueter collected one case of Riese's, two of Rockwitz's, six from Broca and Cruveilhier, sixteen from Tilt), were certainly in part to be laid to the careless choice of patients, and in particular to the use of bad instruments. Latterly, the advocates of the stem have produced figures which prove that the instrument is by no means such a dangerous one. In 247 cases Winckel found no death; in 393 cases collected by Warker there were in thirteen symptoms which called for removal of the stem. We occasionally even see after the use of the simple regulator, the best of all these instruments, inflammations of the mucous membrane of the uterus, of its muscularis, and its serosa, also of the parametrium, and further hemorrhages, abnormal sensations in different regions of the body, without any specific trouble.

Even in case of the most favorable results, it may be noted that the intra-uterine stem acts as an irritant on the uterus, and this alone may be considered the special cause of untoward sequelæ.

The generally recognized contra-indications are: Every inflammatory affection of the uterus and its adnexa (Schröder excepts very old remnants of inflammatory trouble), all affections of the genitals which interfere with the movability of the uterus, such as peritoneal adhesions, cicatrices and exudations in the pelvic cellular tissue, tumors of the uterus and of its adnexa, tumors of the vagina, etc. Diseases of the mucous membrane of the uterus and the vagina should first be controlled, including hemorrhage, aside from those due to pure flexion. Winckel very justly states as a further contra-indication "abnormal sensibility of the uterus, and a general lack of tone in the patient." Lastly we must mention great relaxation of the uterine tissue, the puerperal state, and naturally the suspicion of pregnancy.

Before the introduction of a stem the depth of the uterine cavity and the width of its orifices must be determined by the sound in order to estimate the dimensions of the stem and of its cup. The sound also gives us information in regard to the sensibility of the uterus, and for this purpose the instrument should be left a few moments in the cavity. Preparatory treatment or modification of the sensibility by means of the sound is, however, generally unnecessary; indeed it is far preferable to resort to the stem at once for this purpose. Where the orifices are too narrow precedent dilatation of the cervix may be required, and this is obtainable by tents (Elischer), or by discission. That the stem should only be inserted after healing of the wound is, of course, apparent.

For reposition of the retroflexed uterus, the sound is used, and thereby the flexion is lessened, and the insertion of the stem rendered easier; frequently, however, the straightened uterus must be still placed in its normal position by means of the bimanual palpation.

Schröder and others use the intra-uterine stem at the outset for reposition of the organs.

In extreme degrees of flexion, especially where the cervix is markedly displaced backwards, and where the vagina is narrow, it is often very difficult to insert the stem. The simple stem may be introduced, the patient occupying the dorsal or lateral decubitus, by the hand, or else it is impinged on a conductor or on the point of a blunt sound. The latter is the readiest means, although we must guard against the stem being too firmly fixed on the sound. After thorough disinfection of the vagina and of the uterus, under the guidance of the finger, the stem is inserted into the cervical canal and generally it passes without difficulty as far as the internal os. In order to overcome the resistance at this point, in case of anteflexion the handle of the conductor, or if this is not used the cup of the stem, is pushed backward, so that the axis of the instrument corresponds to that of the uterus, and then, generally under slight pressure on the cup, the apex of the stem passes the internal os. In case of retroflexion these steps are, of course, reversed. A second method of inserting the stem through the internal os consists in pushing the uterus into its normal position by the finger in the vagina, in anteflexion, for instance, by raising up the organ, for thus the curvature of the organ is lessened and the stem readily enters the uterine cavity.

It should never be forgotten that the stem, particularly when carried on the point of the conductor, should be introduced with exactly the same precautions as hold for the sound alone. The uterus should in no wise be injured, and, therefore, the insertion should not be accompanied by hemorrhage.

Hildebrandt, Winckel and others, have advocated inserting the stem on the sound, but this, although often possible, cannot be considered especially advantageous. Without question the intra-uterine stem is best inserted through a duck-bill speculum, the cervix being seized by a tenaculum or by the tenaculum forceps, and drawn downwards, which step diminishes the degree of flexion. The cervix, however, must be hooked by its external surface, for otherwise the tenaculum interferes with the insertion of the stem into the external os.

In case a conductor is used, the stem is removed from it by pressing on the cup of the stem by the finger in the vagina, while the conductor is withdrawn.

Every intra-uterine stem, when properly adapted to the case, must penetrate well into the cavity of the uterus, and the cup must rest well against the external os.

If the stem has been inserted into a retroflexed uterus, the organ must still be anteverted. When this has been accomplished, then, following Schröder's and Amann's directions, sufficient cotton tampons are to be inserted into the anterior *cul-de-sac* to maintain the cervix in retroposition, or else one of the previously described pessaries may be used.

It is much more difficult to insert the stem when it is united with a vaginal pessary, as, for instance, Martin's regulator. It is inserted by means of the finger, or else, as was Simpson's custom with his own, by impinging the stem on a conductor. The vaginal pessary must, of course, be introduced proportionately to the degree of entrance of the stem. Where the uterus is retro-displaced, this is often readily accomplished;. where the uterus is anteriorly displaced, the procedure is more difficult, in which event the vaginal pessary must be pressed greatly against the sacrum in order to permit the insertion of the stem into the os. The pessary of Kinloch is to be preferred to Martin's regulator, because it does not limit so much the movability of the uterus, and since this limitation is purely within our hands by choosing varying grades of rubber bands. It is further more readily introduced than the regulator. In case of retroflexion it is so inserted that the cup of the stem points backwards and the extremity forwards.

The stems connected with elastic pessaries are inserted in the same way. Since the vaginal pessary may in this instance be compressed, it readily passes the introitus, but when the entire instrument is in the vagina, then the lack of space makes manipulation difficult. The air pessaries carrying a stem are inserted on a conductor and then inflated.

It is not superfluous to state that all instruments should be most carefully cleansed and anointed with some fatty substance. The complicated pessaries, in particular, have a number of angles and depressions in which the carriers of infection may readily lodge.

To remove the intra-uterine stem the finger is inserted above the cup of the instrument, and makes gentle traction downwards. In case of the concave cup which accurately fits over the cervix, it may be necessary to hook a broad, blunt tenaculum over it, and by means of this to draw the instrument far enough downwards to permit the finger to complete the removal.

Amann's stem is grasped by a long dressing-forceps; the Kinloch pessary is removed by simple traction on the vaginal portion of the instrument; the regulator (Martin's) is brought into the position which it assumed when inserted, and the stem portion is withdrawn from the uterus as the vaginal portion sinks outwards.

When an intra-uterine stem has been inserted, the patient should keep quiet in bed for at least two days. Slight bearing-down pains frequently are present for awhile, but any other pain, particularly tenderness on pressure, or the least elevation of temperature,—and the thermometer should be used to determine this,—necessitates the immediate removal of the stem, and energetic treatment against the metritis should be instituted, such as poultices, local venesection, narcotics, etc. In case, however, the patient bears the stem well, then she may shortly resume her accustomed habits of life, although great effort, and dancing, riding, jumping, or carrying heavy weights should be forbidden. It is essential that the bowels and the bladder should be regularly emptied, and the vagina should be kept clean by a daily injection of water with the addition of whatever seems requisite.

At the first menstrual period the patient must again remain absolutely quiet, the stem often causing increased and even profuse hemorrhage, and it must frequently be removed. It is wiser, as is Schröder's practice, to take it out at the onset of menstruation. It frequently falls out at this period, either because it is pushed out by a coagulum, or by bearing-down pains, or the uterus straightens out still more during menstruation, the flexion becomes entirely effaced, and the stem escapes.

Sexual intercourse during the wearing of the stem must be counted as injurious, and Olshausen in one instance thought a peritonitis followed on copulation. There are, however, certain uteri so tolerant that they will not react against almost any injury, and Ausländer has devised a funnel-shaped pessary to be worn for the cure of sterility, that is to say during copulation.

From time to time an examination should be made to determine if the stem is maintaining the correct position. It readily glides from the uterus, so that its apex, as we have stated, lies in the cervical canal (Spiegelberg). The instrument must then be re-inserted or replaced by another, but we must first ascertain if an endo-cervical catarrh, or an erosion or ulceration has become established. In the event of this being the case, the complication must be treated before the re-insertion of the intra-uterine stem.

The action of the intra-uterine stem on the uterus is chiefly to straighten its axis, but in addition the drainage of secretion is facilitated, the circulation is equalized and the formation of vegetations is prevented. A further constant effect is swelling of the uterine tissue, the result of the irritation produced by the stem, but this swelling shortly subsides. Not only, according to Winckel, is the uterus caused to contract, but also its ligaments, and this leads to improvement in the position of the organ. As to whether the establishment of a more normal circulation, and the irritation caused by the stem, produces the so frequently apparent thickening in the uterine wall, from the growth of muscular fibres or not, has not been as yet determined. The cases are not very rare where the wall of the uterus opposite the stem becomes thickened, while it is being worn. An almost constant effect of the intra-uterine stem is irritation of the mucous membrane of the uterus, which shows itself by increased secretion, frequently through hemorrhage, although in a single case Haartmann was unable to detect any change in the mucosa.

The length of time requisite for intra-uterine treatment is very variable. It is useless in the absence of indication to remove the stem every day, or to allow it to be worn only a few hours daily. It must, however, be frequently removed, after a few weeks, and possibly changed.

Martin has left his regulator *in situ* for nine months, Winckel for as much as a year, without unpleasant sequelæ. I have personally left aluminium stems for six to eight months without injury.

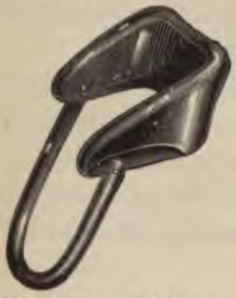


FIG. 119.—THOMAS' OPEN CUP.

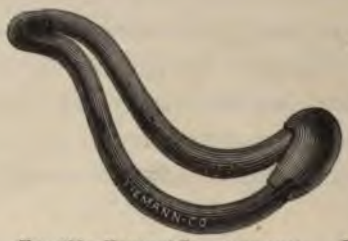


FIG. 120.—THOMAS' RETROFLEXION PESSARY.

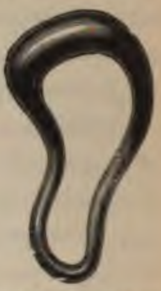


FIG. 121.—MUNDÉ RETROFLEXION PESSARY.

[In addition to the pessaries described by Chrobak, there are a number which are used in particular in this country, and to which we would briefly refer for the sake of completeness.

In anteversion with downward sagging, the latter being the main factor productive of symptoms, the Thomas open cup will frequently be found of service, its effectiveness being dependent on the fact that it lifts the body of the uterus upwards to a degree and thus takes the traction off the neck of the bladder. In case of retroflexion or retroversion with prolapse of one or both ovaries, after reposition of the displaced organs, the Thomas or Mundé bulb pessary will be found efficient in that the posterior fornix is thus filled, and the ovaries, in particular, are kept from falling down again. Ordinarily, the Mundé will be found preferable to the Thomas shape, in that being broader at the anterior end it is not so likely to protrude from the introitus vaginæ. In case of retroversion associated with a wide, relaxed vagina, and a greater or less degree of downward sagging of the uterus, the Noeggerath and the Fowler pessary are valuable. The latter, in especial, we have found useful in instances where it was not so much the retroposition of the uterus as the downward sagging which caused the symptoms. Downward sagging of the organ by making traction on its suspensory ligaments is the chief source of that frequent symptom, "dragging pains in the back, extending into the abdomen," a symptom which is obviously intensified when the patient assumes the erect position, and the cause of which is therefore best determined by examining the patient in this position.

Where retroversion or retroposition with anteflexion exists, associated, as is not uncommonly the case, with shallow vagina and short vaginal portion of the cervix, the purely internal vaginal pessaries will not answer to keep the uterus elevated, and here an instrument which will frequently prove of service is the Thomas-cutter. The objection to this instrument is that it is apt to abrade the posterior commissure, but this objection is scarcely valid where the patient is of sufficient intelligence to learn how to introduce the instrument herself, for then it may be removed at night and re-inserted each morning. The ultimate effect of prolonged wearing of this instrument is a decided deepening of the posterior vaginal fornix, whence it may be possible to substitute later on one or another of the internal forms of retroversion pessaries.

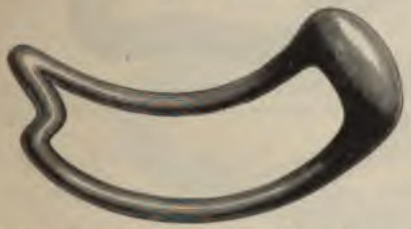


FIG. 122.—NOEGGERATH RETROVERSION PESSARY.

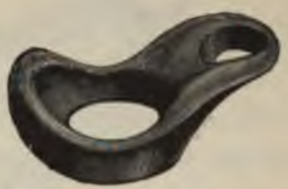


FIG. 123.—FOWLER RETROVERSION PESSARY.

Where a cystocele exists an excellent instrument, as long as it remains *in situ*, is the Gehrung. This instrument tends, however, to turn backwards, and further it retroverts the uterus. Still, while in place it more effectively holds up the cystocele than any other instrument at our disposal. The position of this pessary is well shown in Fig. 126.

For prolapse of the uterus, the best palliative means of retention the insertion of one or more cotton tampons, for where the perineal bo

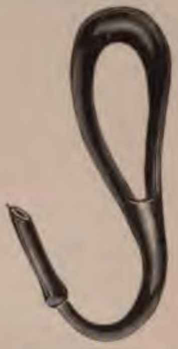


FIG. 124.—THOMAS-CUTTER PESSARY.

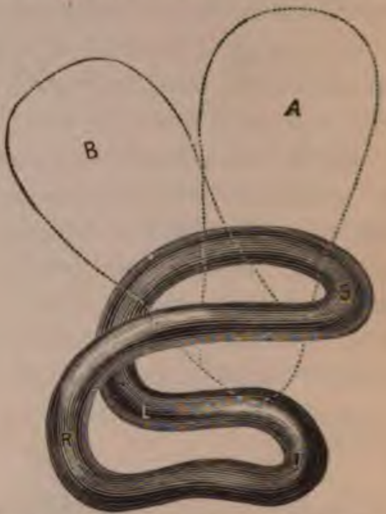


FIG. 125.—GEHRUNG PESSARY. (After *Gehrung.* *A*, Anteversion; *B*, Retroversion.

has been destroyed and the pelvic floor has lost its integrity, we possess no pessary which is effective unless such a large ring be chosen as will

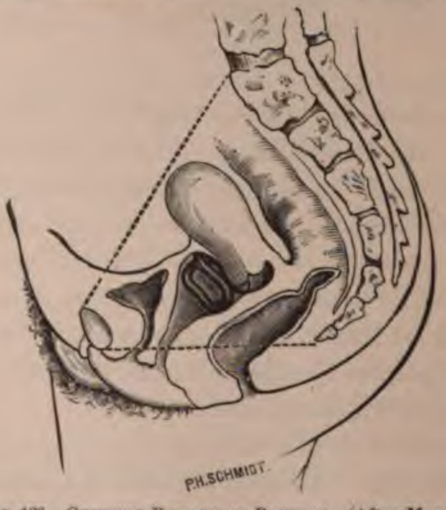


FIG. 126.—GEHRUNG PESSARY IN POSITION. (After *Mundé*.)

ultimately, from distension of the vagina, make the condition worse. The proper treatment for prolapse is the operative (colporhaphy, perineophy, Alexander's operation). In instances, however, where the uterus is prolapsed and the pelvic floor is largely intact, Byrne, of Brooklyn, has devised a pessary which he states will effectively remedy the displacement. The instrument is intended chiefly for women who have passed the menopause, and in whom it is either not desirable to operate or else impossible, owing to refusal on their part.

These additional forms of pessary, together with the well-known Albert Smith retroversion instrument, will be found to amply answer routine purposes. Each practitioner indeed soon becomes accustomed to a certain number of pessaries, and finding that by means of them he can usually accomplish his aim, he takes no account of the thousand and one other forms which are at his disposal. In no gynecological subject, however, is it of greater importance not to be a creature of routine. That practitioner will be the most successful in the application of pessaries who possesses the requisite amount of ingenuity to ever adapt the pessary to his patient, instead of, as is frequently the case, endeavoring to make his patient fit a certain form of instrument. As general rules for guidance it may be stated that the uterus should always be replaced before the pessary is inserted, seeing that the instrument is intended to keep the uterus in position, and not to place it there; further, that pessary is the best one for the individual case which, when in position, interferes the least with the normal range of motion of the uterus; lastly, after the insertion of a pessary, the best way to determine as to whether it will probably prove effective and not harmful, is to examine the patient in the erect position, when the additional factors, gravity and the superincumbent weight of the abdominal viscera, are in action.

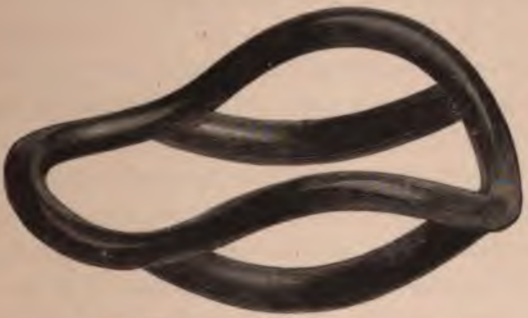


FIG. 127.—BYRNE'S PROLAPSE PESSARY.

In regard to the stem pessary, there is no occasion for any additional statement. Every practitioner will decide for himself, from experience, as to whether it is a safe instrument. Our own impression is that it should rarely be used, and when it is, the precautionary measures taken cannot be too stringent.—ED.]

CHAPTER XXV.

THE APPLICATION OF ABDOMINAL BANDAGES.

I DO not aim at describing here the manner of applying abdominal bandages or dressings after laparotomy or tapping, but only such bandages as are called for in order to give support to relaxed, distended abdominal walls, to increase the intra-abdominal pressure, to lessen the movability of the pelvic organs, and at the same time to subject them to an equable pressure.

The indications for resort to retaining and compression bandages are: Relaxation of the abdominal walls; changes in the position and form of the internal genitals, in particular abnormal movability of the uterus and pendulous abdomen; every procedure after which the abdominal contents are rapidly lessened (removal of fluid from the abdomen, the end of labor, etc.); the presence of tumors which in the erect position cause pressure symptoms from their weight; inflammatory processes in or hyperesthesia of the abdominal walls, and finally hemorrhages. It is worthy of note that, as Hegar and Kaltenbach have shown, the application of an abdominal bandage does not enforce a higher position on the diaphragm, and that, therefore, tympanitic distension may be controlled by means of the bandage.

In estimating the necessity of applying an abdominal bandage, we must be guided by the subjective sensations of the patient. There are certain patients who cannot wear a bandage, because it interferes with the respiratory act in a measure, and even increases pain on account of sensibility of the skin, whence there result under the bandage, in particular, the moist, nutritive disturbances of the skin. These and similar results are, however, exceptional, and in the large proportion of cases gentle pressure and immobilization of the pelvic organs are exceedingly effective. Unpleasant results are more likely to be met with, because the bandage has not been properly applied. The exerted pressure may be unequal or too excessive, so that the circulation in the vessels of the abdomen or of the lower extremities is interfered with; the increase in the intra-abdominal pressure will often cause a deeper position of the uterus and of the ovaries, a downward sagging, to counteract which we must resort to vaginal or to perineal supporters.

Before the application of a dry bandage to the abdomen, the skin must be carefully cleansed, well dried, and covered with starch powder. In case a layer of cotton wool is first applied, then the skin should be greased with fat, vaseline, and the like, or else the cotton will stick to the skin and soon cause considerable pruritus.

In case of patients who are confined to bed a sheet or roller bandage is used. The binder may be applied as follows: A towel, or linen or flannel, broad enough to extend from the ensiform cartilage to the pubes, and twice as long as the circumference of the body, is taken. This is passed under the patient, the ends drawn smoothly together, one end passed under the other, and the other end made fast with safety pins. This bandage does not lie equally on the abdomen, and in order to obtain symmetrical pressure, cotton, jute, etc., must be packed under it, chiefly at the sides. In case it is desired to obtain greater pressure at a given spot, then we lay over this site a thick pad of cotton. If the patient be thin we must at the outset pad the lateral walls of the pelvis with cotton, else the pressure of the bandage on the iliac spines will be painful. This simple bandage limits the movements of the patient considerably, for the bandage readily slips upwards, and even where the patient keeps quiet it remains in place scarcely more than twenty-four hours. The bandage is removed in the reverse order from that in which it was applied.

The abdomen may also be encircled by a roller bandage of calico, flannel, and the like, about three and a half inches broad, or a many-tailed bandage may be used. The roller bandage may be applied simple, or else with spiral turns. Each circlet must be sewed to its neighbor on the sides of the abdomen. Under each turn of the bandage it goes without saying that cotton may be applied.

In order to allow patients to walk around wearing the simple abdominal bandage, axilla and thigh bands may be attached to it, and thus it is prevented from slipping; but more frequently it is preferable to choose one of the ready-made abdominal supporters or girdles. These supporters do not aim usually at subjecting the abdomen to equable pressure, but rather at lifting up, supporting, the portion of the abdomen lying between the umbilicus and the symphysis.

The influence of these bandages on the position of the uterus depends on two factors: The increase in the intra-abdominal pressure, and the limiting of the movability of the pelvic organs. Rectification of an abnormal position of the uterus by means of an abdominal bandage is not possible, still, frequently it has a good effect in modifying the symptoms which are caused by the pathological position of the organ. In case of prolapse of the uterus the abdominal bandage does not lessen but rather increases the symptoms, since the intra-abdominal pressure is increased and the uterus is pressed down further, unless a vaginal pessary prevents. In case of the versions, however, the bandage is of assistance, since it fixes the uterus, the pressure acting on one or another of the surfaces.

Many abdominal bandages have been devised by physicians and instrument makers, and their very multiplicity proves that a thoroughly good one under all circumstances has not been found as yet. The reason of this is apparent when we remember that the abdomen is constantly changing its dimensions, that the curvature of its anterior surface renders difficult the uniform application of a bandage, and that fixed points are lacking on which the bandage may take purchase. Therefore it is why many abdominal supporters slip up or down, and many are so tight that they cannot slip, but cause such great pressure that they cannot be worn for long.

There are many women who are able themselves to make a good supporter. They may be directed to take a quadrilateral piece of elastic material, such as flannel, to place it around the abdomen and to cut it at the sides. In case elastic material is not used, then it should be cut diagonally, not parallel, to the fibres, for thus the extensibility of the material is heightened. The lower edge of this supporter should be cut so as to fit directly over the crests of the ilium, and then a sufficient number of folds are taken and temporarily pinned as to cause the supporter to lie smoothly; these folds are next cut out and the edges sewed together. Behind, the edges of the supporter are laced together, and it is thus kept in place.

Every supporter which is intended to surround the entire abdomen and to subject it to equable pressure, consists either entirely of elastic material, or else elastic portions are inserted into it. All inelastic supporters which have one or more laced portions (one in the centre, in front, and one each side), readily crease and slip.

Elastic supporters ordinarily contain elastic fibres, and either form a closed girdle (Fig. 128) or they are open and must be laced or strapped together, particularly at the sides. They maintain an equable pressure on the abdominal contents, and do not slip very readily, provided the abdominal curvature is large enough. These supporters should be applied over the undergarment, for otherwise the elastic fibres, which are in them, press into the skin of the abdomen and back, and cause pain proportionate to the tightness of the supporter and the distension of the abdomen.

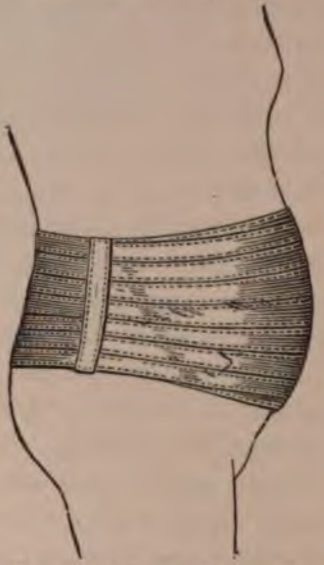


FIG. 128.—ABDOMINAL SUPPORTER.

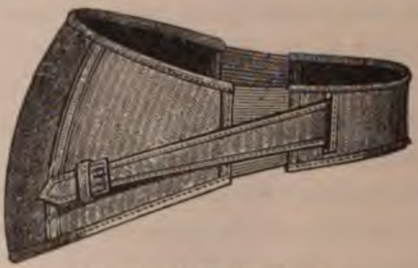


FIG. 129.—ELASTIC SUPPORTER.

Supporters which exert more pressure, and which are used for strengthening the abdomen in the presence of fibroids, cysts, etc., consist only in part of elastic material. An elastic piece is ordinarily inserted in front, at the sides (Fig. 129), or behind, as in the Leiter abdominal supporter (Fig. 130). Frequently strips of whalebone are inserted into the anterior portion of the supporter, which enhance its rigidity and ensure its remaining in place; often, however, these strips exert an unpleasant pressure. Ordinarily there are straps at the lower border of the supporter, which are either drawn from the sides and fastened in the middle, or else are buckled at the sides. The lower border of the supporter should hence be made as narrow as possible to prevent its rising up. Aside from the fact that creases may still form, the slipping up of the bandage is not thus certainly prevented. The only method which certainly answers is the insertion of thigh straps. At the outset the majority of patients complain of these straps, and a number of days must elapse before they become accustomed to them. These bands should be constructed of strong unyielding material, which is lined with silk to lessen the friction on the thighs. It is preferable to cover the straps with rubber, or else to make the straps of slender rubber tubing. These straps extend either side, from the anterior portion of the supporter under the thighs, a trifle beyond the centre where they are fastened. Care should be taken not to have the point of fastening too far backwards, else the straps readily slip into the groove between the nates.

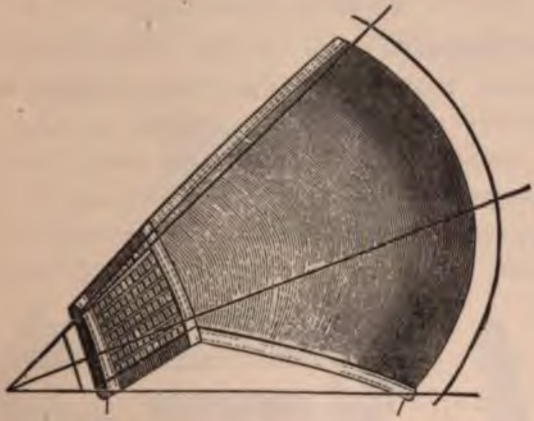


FIG. 130.—LEITER'S ABDOMINAL SUPPORTER.

As a further means of preventing the upward slipping of the supporter, and at the same time to exert greater pressure above the symphysis, a cushion or an air bladder has been inserted into the bandage, as in Bourjeaurd's.

Such bandages are also of use in order to exert, by means of a movable cushion, circumscribed pressure on the abdomen. Any apparatus which is worn in order to exert methodical pressure on any organ, such as an ovary or a movable kidney, should be constructed after the manner of Charrière's hypogastric girdle. As the action of the previously described abdominal bandage consists especially in causing an increase of the intra-abdominal pressure, so do we endeavor by means of this cushion to take a portion of the pressure off the uterus, the cushion being applied so that its lower border projects forcibly against the abdominal cavity. These cushions are oval, heart or kidney-shaped, and are constructed of wood, hard-rubber, or metal, covered with leather or stuffed.

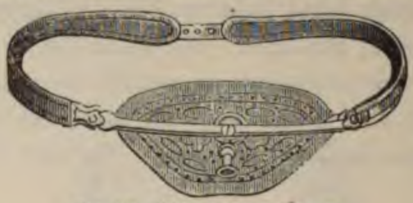


FIG. 131.—HYPOGASTRIC GIRDLE.

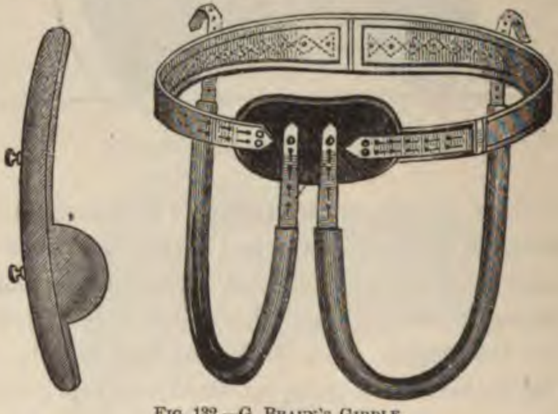


FIG. 132.—G. BRAUN'S GIRDLE.

They are either attached to a stuffed abdominal girdle, so that traction may be made in the horizontal long axis, or else, as in G. Braun's bandage, they are attached to an elastic or inelastic bandage to which thigh straps are adapted. Braun's cushion has a sharply projecting protuberance at its lower border which makes up for the lack of distensibility of the cushion in its long axis. (Fig. 132.)

The pad, as in Trier's apparatus, is also held in place by springs, like those adapted to trusses, and the American bandages in particular are constructed so that the abdominal pad is held in place by a truss spring on each side, the anterior and posterior extremities of which have adapted to them a round, oval, or long slender cushion. The pressure from this apparatus is only exerted on the anterior lower portion of the abdomen, and on the lumbar region. These supporters are generally well borne, and answer their purpose if only the abdominal pad retains a part of its movability.

Other bandages are in use to keep pads over the external genitals in place, or to afford support to the relaxed middle segment, or to hinder the prolapse of the vaginal walls or of the uterus outside of the vulva, and frequently to increase the support of the pelvic floor where vaginal pessaries are inserted. The T-bandage used even by Hippocrates in case of prolapsus ani consists essentially of an abdominal girdle, attached to which anteriorly and posteriorly is a napkin which passes between the thighs. This simple T-bandage is now only used provisionally as a supporter, since the wearing is associated with many disadvantages. The various vulvo-perineal apparatuses are without question more preferable, and they are constructed on the principle of a double T-bandage. Such apparatuses have been devised by Jones, Hull, Nunn, Piorry, C. Braun, Noeggerath and many others. Essentially they all depend on the principle of supporting the perineum by means of a round, oval, or cone-shaped pad, or cushion. This pad is attached to the abdominal binder by four straps or bands, two in front and behind respectively, which may be unyielding or elastic, or formed of a double truss (C. Braun). When using this apparatus, the abdominal portion is first applied, and then the pad is pushed over the perineum from behind, so that the introitus

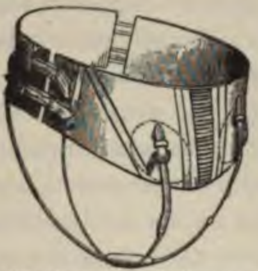


FIG. 133.—NOEGGERATH'S SUPPORTER.

vulvæ is diminished from behind forwards, and then the lateral straps are attached to the abdominal bandage and lastly to the other ends.

These supporting apparatuses are only very exceptionally used, for, on the one hand, the better-constructed pessaries, and, on the other, the plastic operations on the vagina and the perineum, have greatly limited their sphere of utility.

In order to maintain the smaller and lighter supports over the external genitals, strips of plaster may also subserve a useful purpose. Occasionally plaster itself, as, for instance, ung. diachyli, in case of pruritus or eczema, is applied over the parts around the vulva. In these instances, of course, the hair must be shaved from the parts. A simple or a double spinous crutch may also be used in order to maintain a pad in position, or in order to exert compression to one side of the vulva. The objection to a bandage of this sort does not depend so much on the difficulty of applying it, as on the fact that the urethra and the vulva must be left open, and, further, in that it readily becomes soiled. It is well here, as in case of other appliances during the wearing of which the douche must be used, to place a piece of rubber cloth under it, and then when the apparatus is in place, to cover it over with the projecting portions of this rubber. Vulvar bandages are further used during menstruation to receive the discharge, or else, aside from the menstrual period, in case of leucorrhea, and also in case of patulous vulva to disinfect the entering air. These bandages generally consist of slender cushions, about four inches long, which are filled with sublimated or salicylated mineral wool, or jute, etc., and which are attached to a pelvic girdle or to an abdominal supporter.

CHAPTER XXVI.

MASSAGE.

IN the last few years, chiefly in Sweden on Brandt's recommendation, massage has been introduced into gynecology. Von Gerard, Elleaume, Estradère, Berenger-Féraud, Nélaton, Demarquay, Stromeyer, Volkmann and others, recommended it in case of disease of the joints, and it became popularized through Metzger's efforts; but in the diseases of the female genital organs massage meets with difficulties and with objections, which is the reason why it has not been resorted to by many good observers, and why no exact indications have as yet been formulated. Brandt, Hartelius, O. Nissen, and others, find indications from the side of the uterus, but they have not met with acceptance in Germany. The above authors massage in case of versions and flexions, of chronic inflammations of the mucosa and the muscularis, of hypertrophy of the uterus, and, in particular, in case of descent of the uterus, of fibroids, metrorrhagia, para- and perimetritis, pelvic adhesions, oöphoritis, etc.

Brandt's original method consisted in a number of procedures, "taps," "punctiform pressure," etc., which were often limited to the abdomen, but again resorted to through the vagina or the rectum on the uterus. In the discussion of Nissen's paper, in the very home of massage, the procedure found a number of opponents, like Malmsten, and they condemned it not only because it was likely to cause hemorrhage, cellulitis, etc., but also on moral grounds. The teachings of Brandt and his immediate pupils have latterly been considerably modified by Asp, although he clings to the essential procedure, massage of the uterus, which is resorted to by the operator seizing the organ between the fingers of both hands, even as during the bimanual palpation by vagino-abdominal or the recto-abdominal method, and then exerting a slight, lasting, pressure upon it. In addition, the lower portion of the abdomen is kneaded.

Up to to-day the Swedish gymnastic cure and massage have largely found their home in cold-water-cure institutions, although more than thirty years ago, possibly as the result of Priessnitz's teaching, some of the movements were resorted to in case of disease of the pelvic organs, the method, however, not being specially known or connected with the term "massage." My own recollection and recorded results testify, however, to the fact that, while certain physicians, who kneaded without special selection of cases, obtained good results, others had bad results, such as abortion, rupture of tumors, etc.

To-day a number of authors have spoken in favor of massage: Asp, Hartelius, Reeves Jackson, Operum, Bandl, Hegar, Schröder, Prochownik, Runge, Reibmeyer (who has given a good digest of the literature, as well as described the methods of performance); myself, and others, have frequently had the opportunity to note good results.

The unquestioned facts that massage influences greatly the motion of the blood and of the lymph, that it increases absorption where other means are not applicable or have been ineffectively tried,—such facts, which have been substantiated experimentally by Mosengeil, allow us to state with certainty that the treatment by massage is applicable to many cases, and that it is entitled to a prominent place in the therapeusis of the diseases of females.

As to whether by the gymnastic treatment of the pelvic organs the elasticity and contractility of the uterine ligaments may be increased, as is claimed by Brandt's pupils, must for the present remain in doubt; but it is to be noted that by means of the massage of cystic tumors very profuse diuresis may be produced, as Winiwarter's observation proves, and as I have often noted myself.

The difficulties in the way of the general acceptance of massage depend particularly on the unpleasant results and the dangers which may follow on manipulation of and in the female genitals. Asp's suggestion that the massage movements should be performed by women only partially does away with the obstacles, since these in great part depend on the physical sensibility of the patients, and besides, as Prochownik and Reibmayer have insisted, it is essential that the physician himself should conduct the treatment for a sufficient length of time to satisfy himself in regard to the exact indications and essential technique.

We must, therefore, on the one hand, test the sensitiveness of the patients after the methods we have already dwelt upon, and, on the other hand, often only resort to massage when it has become obvious to the patient herself that nothing can be accomplished in any other way (Prochownik). These precautions are less necessary in those instances where the desired aim may be secured by external massage.

The chief indications for massage are to influence the absorption of exudations and of transudations, the stretching and methodical straining of cicatricial bands and thickened ligaments, the equalization of the circulation through the pelvic organs. Under these indications are included, therefore, para- and perimetritis, exudations in the pelvis, sub-involution.

In case of displacements and of flexions of the uterus, I have only seen results when they were dependent on one or another of the above-mentioned processes. Rosenstein also advises massage in hæmatocele; Douglas Graham in amenorrhea and dysmenorrhea.

All acute inflammatory diseases are contra-indications to massage. The effect of massage on the body heat has not as yet been sufficiently studied. I have often in case of general massage, in the absence of any recognizable affection, seen the temperature rise .5 to .75 of a degree, and have considered this rise an indication for stopping the massage. For the sake of safety it is best only to institute massage when for some months fever has been absent. Those cases are to be excepted where we aim by massage to cause dense infiltrations to break down, to become abscesses. Such a purpose is of questionable value in the pelvis, but in the mammæ I have often thus seen infiltrations, which had existed for years, cured through conversion into abscesses.

Other contra-indications are pregnancy, the suspicion of phthisis, latent gonorrhea (Prochownik). Massage should also not be resorted to at the menstrual period.

In regard to the technique of massage we must distinguish between an external and an internal, an active and a passive. The external consists essentially in centripetal strokings and kneadings, which are applied by the flat hand, the fingers, the thenal eminences, the knuckles. The skin, for the process must be applied to the bare skin, must be smeared with grease, if necessary shaved. Where possible, the direction should be such that the massaged part lies on a firm surface. Thus we press against the posterior pelvic wall, the symphysis, the iliac crests. In case of old exudations we first begin to massage at the borders, and when absorption has here taken place, we proceed to the centre of the mass. The association of warm baths (Ziemssen) and warm vaginal injections (Prochownik, Runge) assist greatly the efficacy of massage.

Internal and combined massage is resorted to either from the abdomen and the vagina, or from the abdomen and the rectum, or from the vagina and the rectum against the symphysis and the anterior surface of the sacrum. The rules for resorting to these combined methods are similar to those described under the respective subjects. The finger in the vagina or rectum should be oiled, the external hand not. The finger in the vagina is kept quiet in order not to excite the patient, and it steadies the parts which are rubbed and pressed upon by the external hand.

If one hand alone is used in the pelvis, then here as well the borders of the swelling are to be first manipulated, otherwise an abscess may readily be caused to form in the centre.

During the massage the patient should lie on a firm couch in a position convenient to the operator, for the steps of the method are very tiresome and require the exercise of strength.

External massage should last from ten to fifteen minutes, the internal much less, at best only a few minutes.

After the end of the procedure the patient should lie quiet for awhile, particularly if she has any pain.

Pelvic massage should be associated with the use of warm baths and injections, of medicated baths and resorbents (iodine, iodoform), and also with systematic exercise of the loins and the lower extremities (Reibmayer), even as in case of general abdominal massage.

Passive massage consists in resort to pressure or traction on bands and adhesions in the pelvis. We have often referred to the fact that continuous traction will cause softening and stretching of the tissue to which it is applied, even as do Bozeman's dilators or Prochownik's hard rubber cylinders, when left for a number of hours to one half day in the vagina.

With the same end in view I have to advantage used the previously described elastic traction, which obviously will answer the purposes of elastic pressure.

CHAPTER XXVII.

SUB-CUTANEOUS AND PARENCHYMATOUS INJECTIONS.

HILDEBRANDT was the first to point out the good results obtainable from resort to ergotin injections, in case of uterine myomas. Since then the researches of many investigators have proved that, while injections of ergotin only very exceptionally cause the disappearance of the tumors, they certainly in many cases arrest the growth, and have a marked effect on the hemorrhages.

Originally Hildebrandt used the ergotin of the German Pharmacopeia, dissolved in water and in glycerine. Wernich prepared a pure dialysate of ergotin; Dragendorff recommended sclerotinic acid, which in my hands has been productive of no results, as well in man as in animals; latterly Marckwald has used ergotinin, an excessively costly preparation; and finally Bombelonsch's preparation has been extensively used, although its composition is not known.

I use almost exclusively the *ergotinum vis depuratum,* which is prepared by dissolving the extract of ergot of the German and Austrian Pharmacopeia in water, then filtering it. The watery solution, to which I add nothing, since mixtures are likely to cause pain or induration, must be absolutely clear, and, since it rapidly alters, it must be always freshly made.

It has been objected to these injections that they are very painful, and cause indurations, even abscesses; but when such is the case it is usually on account of lack of care in performing the slight operation. In a thousand or so such injections I have never witnessed abscess.

This method of treatment by ergotin requires a long time, and often from fifty to one hundred injections must be administered before we reach any result, and since the injection causes slight pain, it is essential that the patient should possess endurance and strength.

In the performance of even this slight operation, strict antiseptic precautions should be taken. A freshly made, filtered solution should be used each time. The skin of the surface into which the injection is to be made must be washed and brushed with soap and water and disinfected with carbolic. The absolutely clean syringe is to be filled full of the solution, and a fold of skin having been lifted the needle is plunged deep into the subcutaneous cellular tissue. Injections which only enter the corium regularly produce painful indurations. After the emptying of the syringe the fluid is disseminated by rubbing, a few cold-water pads are applied over the puncture site, and the patient is told to keep quiet for about one half an hour. This injunction applies more particularly to susceptible individuals, for there are many women in whom the injections may be made without the precaution of after rest.

The pain which follows the injection is localized at the puncture site, and often extends to the uterus, which is caused to contract by the ergotin. Only when the above precautions are neglected do we occasionally see painful indurations or even abscesses.

Hildebrandt used at the outset a solution of one to seven, but I always use a half or whole syringeful of a one to ten solution. We should first test the sensibility of the patient, and use but little ergotin. Collapse, nausea, cramps are sometimes noted, and in one instance, after the use of a total dose of fifteen grains to one drachm for a week, I noted gangrene of a finger. As a result of numerous observations, and the same has been the experience of Marckwald, Röhrig, and others, it seems to me that the associated use of hot baths not only increases the action of the ergotin injections, but causes them to be better borne.

The parenchymatous injections recommended by Simpson in 1856, have often been used since by Thiersch, Luecke, Hueter, Gallard, Williams, Hegar and Kaltenbach, Collins, Bennet, Delore and others, and latterly Schücking has warmly advocated them.

Simpson and Thiersch used parenchymatous injections into tumors, particularly carcinoma, in order to cause them to break down, and since these injections have been resorted to in order to obtain a more direct action of the agent; thus ergotin is injected into the tissue of the uterus, instead of into the subcutaneous cellular tissue, and resorbents (iodine and solutions of iodide of potass) are injected into old parametric exudations, and parenchymatous injections are also resorted to in inflammations of the uterus, after Hueter's method, carbolic acid or Fowler's solution being used (Schücking).

The injection of caustic solutions into a carcinoma or its base is a good procedure and worthy of greater popularity. We can often thus reach the deeper parts of the growth better than with cutting instruments. For this purpose, nitrate of silver solutions, caustic potass, chloride of zinc, brom-alcohol (Schröder, Williams), acetic acid in varying strength.

Parenchymatous injections into the cervix have often been made by Delore, in case of myoma, using strong solutions, and he has witnessed many untoward sequelæ and also abscesses. Schücking considers that these injections act much more quickly and certainly on the growth of fibromas than the subcutaneous injection. In a not very large number of observations I have not, however, seen any striking results. Still I have never, and Fritsch makes the same statement, seen after a parenchymatous injection any untoward sequelæ, and therefore I believe that their worth should be still further tested. I can certainly state that injections into the uterus or into old exudations to cause their absorption, are not dangerous. In particular has Schücking found that the injection of liquor potass. arsen. into the uterus is a good measure in case of sub-involution, which he believes is due in part to the retrograde metamorphosis caused by the arsenic, and on the other hand, to the local irritation caused by the injection, which results in consecutive shrinkage of tissue.

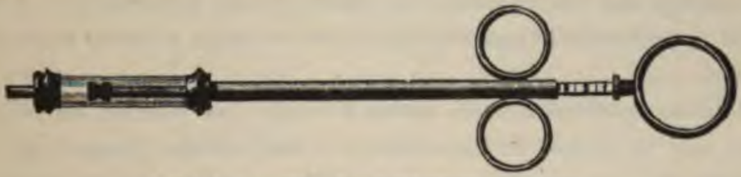


FIG. 134.—SYRINGE FOR SUB-CUTANEOUS INJECTIONS.

In order to make these parenchymatous injections, the ordinary hypodermic syringe with strong needle is used, or else the syringe is lengthened, and rings for three fingers are adapted to it, which assist in the procedure (Fig. 134).

Careful antisepsis must, of course, be secured, and since it is always possible for the point of the syringe to penetrate into the cervical or the uterine cavity, these cavities should also be disinfected. The cervix is exposed through the duck-bill speculum, or through the cylindrical, if we do not propose to inject deeply; the organ is steadied by a tenaculum, and the needle of the previously filled syringe is driven deeply (half an inch) into the uterus or into the tumor. The resistance of the cervix is unquestionably greater than that of the body of the uterus, and we must be careful to see that the needle does not bend, and to inject slowly about one-half a syringe full. In case the tissue is too dense the fluid will escape, and the same thing happens when the mucous membrane is perforated and the point of the needle has entered the uterine cavity. In order to avoid this, the needle should be inserted parallel to the cervical canal.

In case of deep penetration in the opposite direction, the needle may enter the peritoneum or the parametrium. Although, according to Schücking, such an accident does not amount to much, still it is unnecessary and is readily guarded against.

When the desired amount has been injected, then the needle is drawn out quickly, and the puncture site closed at once by a tampon. I have found it preferable to pass a suture or else to apply a strong serres-fines forceps.

I have, as stated already, never seen any bad results; still a large vessel may be opened by the needle and the resulting hemorrhage will interfere with the injection, and may call for a suture. In case an abscess should form, it will probably empty by the puncture tract, but if it does not, then this must be done artificially. Such an abscess might prove very unfavorable in case the needle is not inserted into the uterus or through the vagina, but, as in Deloro's practice, through the abdominal wall into the tumor, a method which I have never as yet attempted.

ELECTRICITY

IN

Gynecology and Obstetrics,

BY

EGBERT H. GRANDIN, M.D.

CHAPTER I.

GENERAL CONSIDERATIONS AND DESCRIPTION OF APPARATUS.

UNTIL quite recently electricity has been used in the treatment of the diseases of women only after a spasmodic fashion, so to speak, and only by a few gynecologists, the majority not resorting to it at all, largely on the score of the preconceived notion that it was not of much benefit. A glance at any one of the standard treatises on the diseases of women proves how little the worth of this agent has been appreciated, for where reference is made to it at all it is largely for the purpose of summarily dismissing it in favor of other therapeutic methods apparently more active and necessitating the expenditure of less time. Doubtless, also, many gynecologists have been deterred from the use of electricity owing to the belief that its application necessitated a thorough knowledge of the physics of the agent, and for this study they have neither had the time nor the inclination. We believe, however, that, given a knowledge of the first principles of electrical phenomena, the practitioner is in a position to use the agent intelligently and to obtain good results, although we would not be understood as underestimating the value of closer study in leading to more scientific application.

French observers have contributed much of value to the subject of the electro-therapeutics of the female sexual organs. Tripier has intelligently worked in this direction, and in particular Apostoli of Paris, to whom indeed belongs much of the credit for laying the foundation of what may be termed with justice new methods of applying electricity to the female sexual organs, methods which promise to prove valuable adjuncts to our routine measures of treatment of many of the inflammatory and non-inflammatory diseases of women. German and English writers on gynecology are as yet content to leave electricity largely unnoticed, but in this country numerous observers are beginning to report their results, and many a quiet worker is satisfying himself that there is value in what has been so long neglected, the full measure of which the near future will with certainty determine. The time is not ripe as yet for great enthusiasm; the road is only being marked out; much of the old will have to be thrown aside, and much rather startling in its novelty will have to be accepted; but, if we mistake not the signs of the time, the scientific use of electricity is going to curtail to a considerable extent the sphere of usefulness of many an agent, such as the intra-uterine applicator for instance, and abdominal section in case of certain inflammatory affections of the pelvic organs will grow as markedly infrequent in the future as it has rather alarmingly increased in the past.

In order to attain this end or even to approximate it, it is essential that the gynecologist shall approach the study of electricity from a far different route from that followed by the neurologist. The latter resorts to electricity for diagnostic and for prognostic as well as for therapeutic purposes. He deals mainly with the effect of the agent on nerves and with the reaction of muscle. In his hands the fluid is ordinarily disseminated over wide tracts and surfaces. His electrical tests must be delicate even as is the tissue with which he is chiefly occupied. He must work indirectly, so to speak, in order to reach the organs he would treat, and he must above all avoid strong currents in the instances in which the relatively sound nerve tissue is at all implicated. The gynecologist, on the other hand, does not resort to electricity for the formation of his diagnosis. It is not with him a question of the determination of nerve force or of muscle reaction. The organs which he aims at subjecting to the electric current are closely grouped together in the pelvis, and it is here that the current is localized. He deals chiefly with perverted local nutrition, with local congestion or its consequences. His knowledge, hence, of the physics of electricity need not be so exhaustive as that of the neurologist. Sufficient for him if he knows the peculiar properties of the forms of electricity at his disposal, if he constantly bears in mind the different action of the poles, and then, having made his diagnosis, all that is necessary is the intelligent application of the special property which in the given case seems called for. In short, if he wishes to stimulate, to congest, he must know which current and which pole will do this, and similarly where he aims at sedation, absorption, cauterization, or local anesthesiation.

Although we are simply on the verge of the development of a new era in the application of electricity to the diseases of women, and although the possibilities in this direction cannot as yet be distinctly formulated, still the elementary principles on which this application depends are established, and the aim in the following pages is to tersely state these principles, and to point out their application to the diseases of women. Knowledge of these principles is essential in order that electricity when it is used at all may be used with proper understanding, and not blindly and with disappointment as has been the case in the past, and is still largely so to-day in the hands of many who occasionally endeavor to re-inforce time-honored routine methods by electricity.

The contributions to the special electro-therapeutics of the diseases of women are largely scattered in medical journals and in special monographs. While endeavoring to do justice to all it is but fair to state that in the elaboration of these pages we have in particular utilized the writings of Apostoli, of Paris, and of Engelmann, of St. Louis, who may fairly claim to be the pioneers in the direction of systematizing the rational use of electricity in the diseases of women, and who, above all, teach us the extent to which it is justifiable to utilize the incalculable power of the agent when localized in the pelvis, and yet not inflict damage on our patients. Our purpose, then, is to gather our knowledge within a convenient compass, stating such deductions as appear at present justifiable without attempt at dogmatism, for the time is hardly ripe as yet for positive statement except in connection with certain conditions, and enthusiasm must still be greatly tempered. The obtainable results are sometimes, true enough, little short of marvellous, but again, as yet, they are often disappointing.

It must be apparent to every gynecologist, and to the general practitioner in the habit of treating the diseases of the female pelvic organs, that our routine methods are often slow in action, are frequently nugatory as regards cure, and, exceptionally true enough where requisite precautions are taken, carry with them considerable risk to the patient. The tendency of to-day, indeed, is to limit the sphere of applicability of many of these methods, in particular applications to the interior of the uterus, and purely vaginal medication is in the hands of many being largely substituted. By vaginal medication is understood chiefly the use of the dry or wet tampon, the aim of which is, ordinarily, the relief of pelvic congestion, and the equalization of the peri- and the uterine circulation, both of which aims are accomplished mainly through the support given to the uterus and its adnexa. Support by the tampon, depletion by glycerin, improvement of nutrition by one or another agent applied to the vaginal vault, such are the routine non-surgical methods favored to-day by many of the leaders in the specialty. There can be no question but that the intra-uterine applicator and the pessary are far less frequently resorted to than was the case only a few years ago, and the reason is that in the hands of many these agents very often disappoint well-grounded expectations, even as they frequently fall far short of effecting a cure. What we seek is an adjuvant method which will yield speedier results and more permanent if not always lasting ones; and the wonder is that, in view of the favorable data derivable from a study of what electricity accomplishes in other departments of medicine, this agent has not, until quite recent date, begun to be systematically used in gynecology. It improves nutrition elsewhere, it stimulates, it allays pain, it causes absorption in other regions of the body, and it surely hence would not be irrational to claim these same properties for it when applied to the pelvic organs, even if the experience of as yet only a limited number of observers had not amply proved the vast superiority of this agent alone or when associated with routine methods over these methods apart from resort to electricity. The teachings of Tripier, Apostoli, Mundé, Engelmann, and others, are gradually gaining acceptance, and the day is not far distant when electricity will become a very prominent factor in the relief and the cure of morbid changes in the female sexual organs. A vast advance has already been made towards the attainment of more general recognition of the value of this agent in routine gynecological practice, since it has been proved that its intelligent and satisfactory use requires scarcely more time than many of our routine methods, for thereby an often-expressed objection has been overthrown. Assuming then, and in this we are to-day justified, that electricity, as applied to the female sexual organs, is safe, easy of application, painless practically, and often curative, its general acceptance can no longer be deferred. Every gynecologist must learn how to use the agent in accordance with the developing methods of the present, if he would not be left far behind in the race for successful results.

The varieties of electricity of value in the routine treatment of the diseases of the female genital organs are the galvanic and the faradic, and these varieties with the essential apparatus we will describe in turn with sufficient explicitness, we trust, to enable the reader unfamiliar with electrical appliances and properties to understandingly utilize them in his practice. For exhaustive detail and theoretical amplification we are forced to refer to works which treat of the physics of the subject. Static electricity we will not refer to, since we are considering purely routine local methods which come within the sphere of the gynecologist, and since, furthermore, however valuable this variety of electricity be to the neurologist, data in regard to its value in the diseases of women are not at our disposal.

The gynecologist should possess the following apparatus: A galvanic battery, a milliampèremeter, a faradic battery, a set of electrodes for external and internal applications, a rheostat.

GALVANISM.

The galvanic battery is the source of a chemical, continuous current, and the properties of this current are very different from that furnished by the faradic battery. The current results from the immersion of two dissimilar metals in some solution which will decompose them. One of the metal plates is more readily affected than the other, and when the plates are connected together the current starts from the affected plate towards the one least affected. This latter plate receives the electricity and gives it off, whence its external extremity is known as the positive pole, the external extremity of the other plate to which the current returns being called the negative pole. The effect of the current received from one or the other of these poles is markedly different, and on the thorough appreciation of these differences will depend the therapeutic results obtained from the use of the galvanic current. The characteristics of these poles may be expressed as follows: The *negative pole* is more active than the positive, the chemical effect being greater; it is the painful, irritating, caustic pole, and its tendency is to destroy, to produce hemorrhage. The *positive pole* is anesthetic, the least painful, causes absorption and tends to check hemorrhage. Apostoli has shown that the cicatrix formed by the positive pole is essentially different from that formed by the negative. From the former we have "a hard, retractile," from the latter "a soft, non-retractile" cicatrix, and these differences in caustic action may, as we will see, be used to great advantages in certain morbid conditions of the female genitals.

It is not *per se* a very essential matter as to what special form or make of galvanic battery the gynecologist possesses. This is a matter which will depend on the taste and the means of the individual. It is, however, of prime importance to own a battery containing an ample number of elements for routine purposes, and it is wise to select a cell which will require the least possible attention. The batteries which we figure are those with which we are personally familiar, and the implication is not that they are superior to those of other manufacturers. It is desirable t have at least thirty-six to forty cells at one's command, especially wh the generating fluid is of the kind which requires frequent renewal, a where the cell is not sealed, and therefore where there is constant loss evaporation. Individual taste may be consulted as to whether the batt shall be portable or stationary, although where electricity is used in routine daily practice it is, for obvious reasons, advisable to possess both forms. In the stationary battery the elements may be either enclosed in a case or cabinet, or else, where in particular the Leclanché cells are used, they may be placed in the cellar or closet and thence connected with a

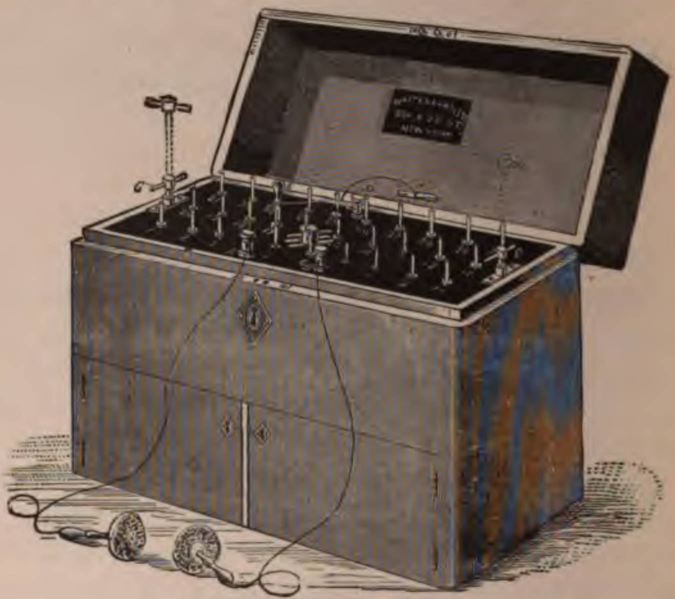


FIG. 1.—PORTABLE GALVANIC BATTERY.

key-board on the office wall. Many of the stationary batteries furnish both the galvanic and faradic currents, and are so arranged that the galvanic may be readily interrupted, thus placing at our disposal the galvano-faradic current. Obviously it is advantageous to possess a combination battery provided only that the faradic elements are independent of the galvanic. Every battery is furnished with a current selector which enables us to bring as many of the elements as is desired into the circuit.

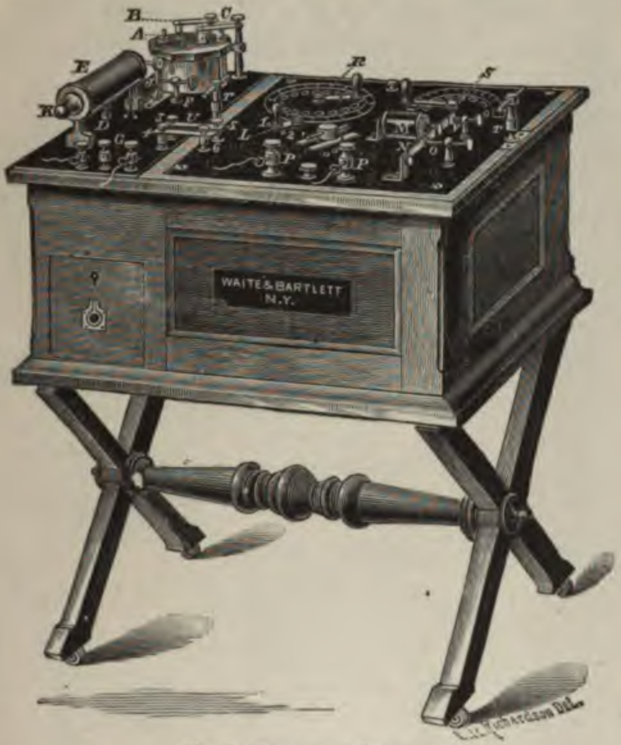


FIG. 2.—STATIONARY BATTERY.

Whatever the form of battery it should be carefully attended to in order that the connections be kept clean and the instrument not damaged by dust or moisture, otherwise the instrument will fail in what is required of it and there will be inevitable disappointment in the obtained results.

Beyond these general remarks we do not deem it necessary to speak about the elementary principles which underlie the use of the battery. The manner of making connections, of immersing the elements, of filling the cells, etc., are points which can best be learned practically and must

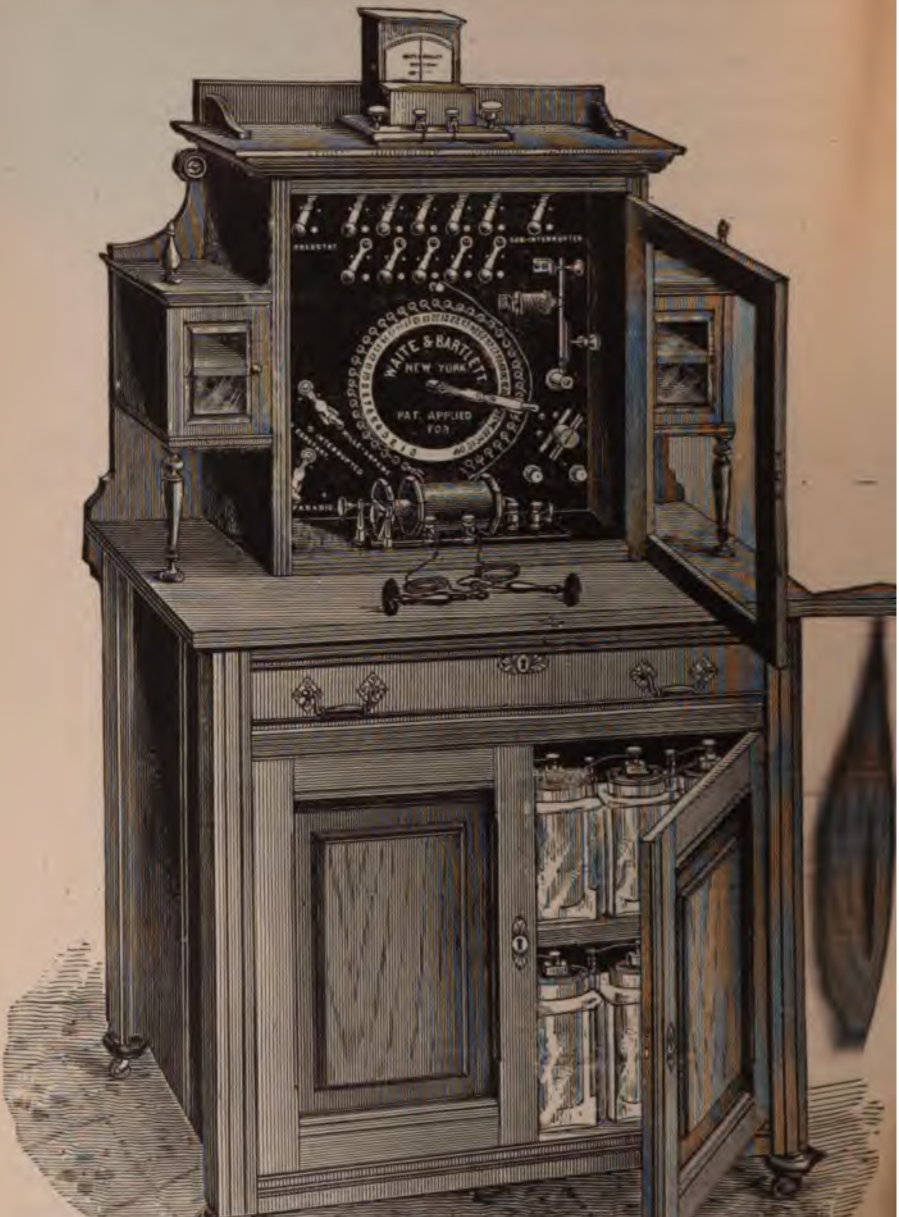


FIG. 3.—CABINET BATTERY.

learned before the force generated can be used intelligently. The ecologist must know his battery and how to use it and not misuse it, as the engineer must know his engine in order to obtain the requisite speed without injury to the source. A very essential point, on which would lay renewed stress, is the strict necessity of recognizing and of differentiating the positive from the negative pole. The majority of galvanic batteries in use to-day are provided with a so-called pole-changer which will tell us at a glance which is the negative and which the positive pole, and which also enables us to change these poles at will, something which in gynecology is rarely advisable during the application of elec-

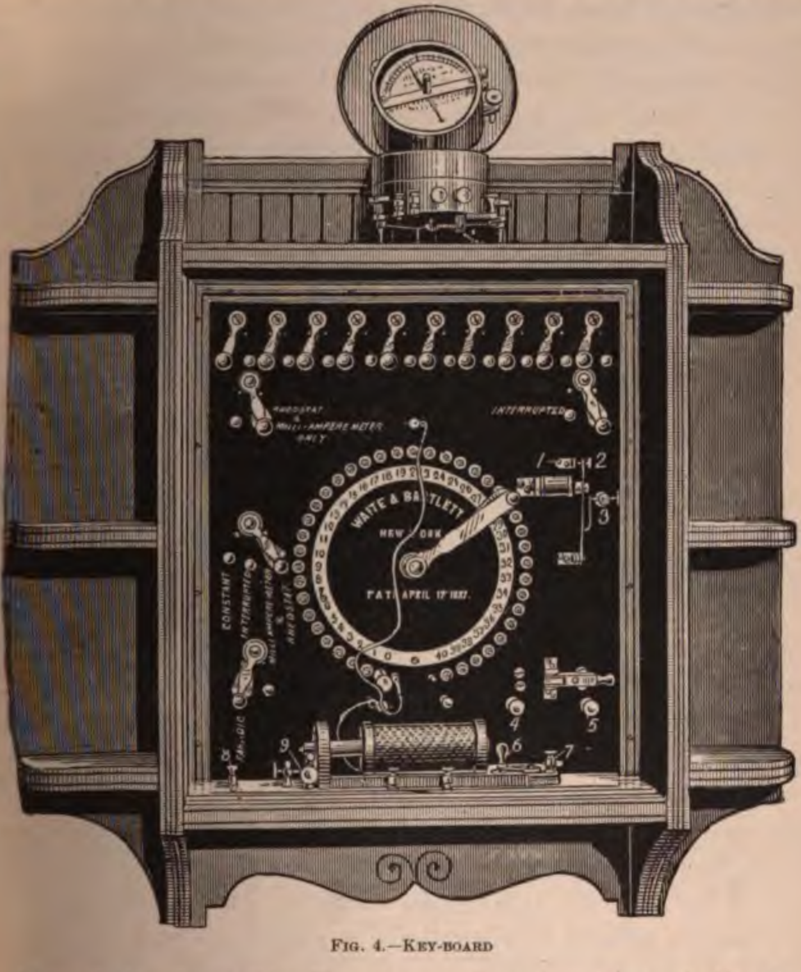


FIG. 4.—KEY-BOARD

tricity. At the outset we should determine which pole we wish to utilize as the active one to meet the special indications, and it should remain the active one unless the indications change. When the properties of the galvanic current are thoroughly understood, the operator, bearing in mind the peculiar properties of the two poles, will have no difficulty in selecting the active one for the special case. Thus, in general, when he wishes to lessen congestion, to check hemorrhages or leucorrheal discharges, to allay pain, he will choose the positive pole as the active one: on the other hand, when he aims at cauterization, at stimulation, at causing absorption, he will select the negative as the active pole. The effect of these poles, in degree, will vary, of course, with the intensity of the current, a point to which we will refer somewhat at length further on. By the term active pole we mean the one which is directly applied to the organ or part which we aim at affecting, and this we will amply illustrate in the discussion of the special uses of electricity.

FARADISM.

The faradic current is chiefly mechanical in its effects, although, in general, it possesses similar properties to those of the galvanic current in a less degree It is an interrupted, to and fro current, instead of being constant, continuous. Its chemical action is very weak, if it exist at all, and its main utility is for causing contraction and thence stimulating. The action of the battery depends on the principle that "if the conjunctive wire of the battery (galvanic), coiled on itself and properly insulated, is laid on an insulated surface, and in its immediate neighborhood is placed another coil of insulated wire, connected with a galvano-multiplier, it is found that when a current is passed through the former the needle of the multiplier is on the instant deflected, then it oscillates a little, and presently comes to rest. If now the circuit is opened the needle is again deflected, but this time in the opposite direction. Instantaneous currents are, therefore, induced in one wire by a galvanic current passing in another wire near it. The wire connected with the battery transmits an inducing current; the secondary wire transmits an induced current."[1] Now by rolling these wires into coils these currents are rendered more powerful, and the current derived from the induction coil is intensified by placing pieces of soft iron in the centre of the coil, which, becoming magnetized, as the current traverses the coil, induce instantaneous currents in the coil at the moment of acquiring and of losing its own magnetism. (Bartholow.) The faradic battery then is composed essentially of the galvanic cell, of two or more coils, and of an apparatus for interrupting the current which is called a rheotome. The current is formed at the time of breaking and of contact, and aside from the construction and the number of the coils, its effect is dependent on the rapidity of the interruptions. The difference between the poles is not so marked as in case of the galvanic current; the positive pole, however, is more sedative. and the negative more stimulating.

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[1] Bartholow: Medical Electricity.

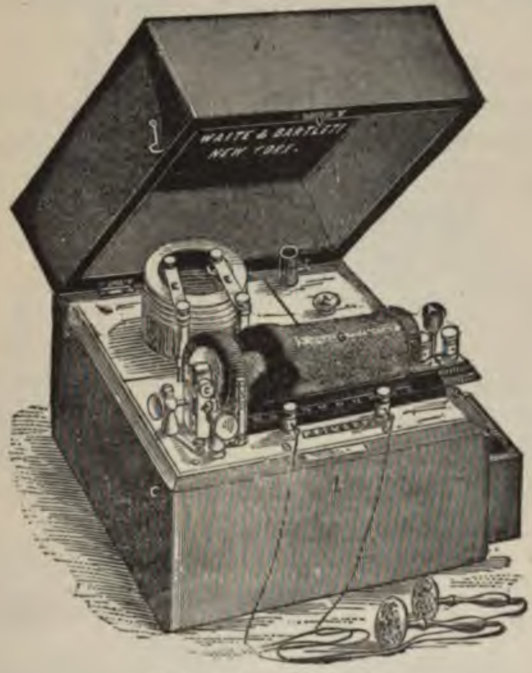

FIG. 5.—FARADIC BATTERY.

The coils of the faradic battery are different in construction, and the therapeutic effects obtainable from one coil are not similar to those of the other. One coil, the primary, is composed of short thick wire, and the other, the secondary, of long thin wire. The coil of thick wire gives a quantity current, and is especially useful for exciting muscular contractions; the coil of thin wire gives a tension current and has a marked sedative effect. These differences in the utility of the faradic current have been in particular emphasized by Apostoli in connection with the electro-therapeutics of the female genital organs.

The gynecologist should either possess a separate portable faradic machine, or else a combination galvano-faradic battery. There are so many excellent faradic apparatuses obtainable now-a-days that the difficulty will not lie in obtaining a good one but rather in selecting one from others equally good. One of the cleanest and most readily managed is the Kidder tip cup. The Gaiffe, or one of its numerous modifications, or the recently devised Stanley battery, will also be found valuable, especially, as will be noted further on, for use in obstetrical practice, the latter and the Gaiffe because, being so compact, they may be carried without difficulty in the ordinary obstetric bag. The Stanley battery has

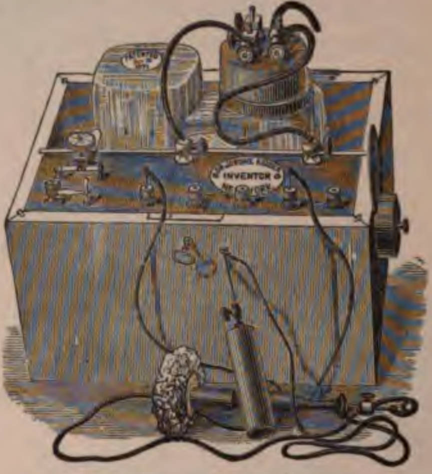

FIG. 6.—KIDDER TIP-CUP BATTERY.

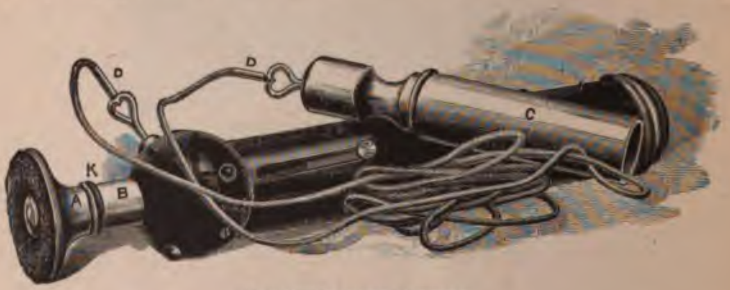

FIG. 7.—STANLEY BATTERY.

further the special advantage of being readily handled without the least risk of spilling the contents of the cell.

These faradic machines we will not specially describe, nor enter into details in regard to their management, for the reason, even as with the galvanic battery, that these are points which can alone be properly learned practically. Where electricity is used as a routine measure in gynecological practice we believe it preferable to possess one of the combination apparatuses, because, although only exceptionally useful, it may be desirable to utilize both currents at once.

THE MILLIAMPÈREMETER.

The next instrument which the gynecologist should possess, in order to use electricity intelligently, is a galvanometer, an instrument by means

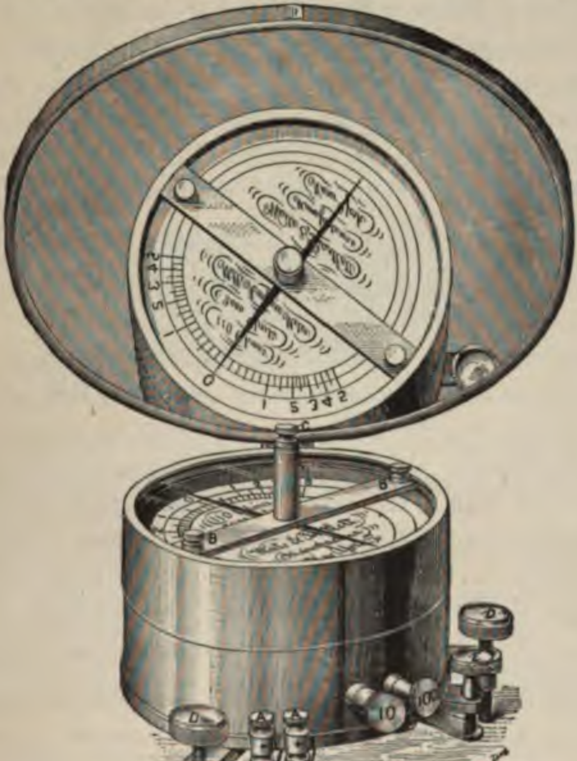

FIG. 8.—THE GALVANOMETER.

of which the intensity of the current may be measured, so that he may be enabled to estimate accurately the dosage administered to the patient. It was formerly the custom, and is still largely so among gynecologists, to use as a guide the number of cells brought into the circuit, but this is a rough method and inaccurate, seeing that the internal and external resistances vary so markedly. To check our results, therefore, and to know exactly what we are doing, it is essential to include a galvanometer in the circuit. We are speaking now purely of the galvanic current, for the measurement of which alone is the instrument of utility.

The galvanometer is subdivided into milliampères, the unit of electrical measurement, and the instrument is, therefore, ordinarily spoken of as a milliampèremeter. For routine purposes, an instrument registering from forty to fifty milliampères is sufficient, unless, indeed, it should prove expedient to follow in the footsteps of Apostoli and Engelmann, who use intensities as high as two hundred milliampères and over, as we will note when we speak more in detail of the selection and the strength of the current. Sufficient here the statement that, except where electrolysis is aimed at, a subject which will be considered in a separate chapter, forty to fifty milliampères will answer for routine work.

THE RHEOSTAT.

A further instrument to which we will refer, although it is not strictly essential to the gynecologist, is the rheostat, which subserves the purpose of interposing resistances in the circuit so as to modify the strength of the current. It is an instrument of greater utility, however, to the neurologist than to the gynecologist, seeing that the latter need not concern himself so much about slight modifications in the intensity of the current. The simplest and most practical form is the water rheostat, which consists in a column of water, interposed in the circuit, "and so arranged that the distances between the extremities of the metals that close the circuit through the water can be increased or diminished at pleasure."[1]

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[1] Beard and Rockwell: Practical Treatise on the Medical and Surgical uses of Electricity.

ELECTRODES AND THEIR GENERAL APPLICATION.

Having briefly sketched the nature of the electric currents of use in gynecology, their general applications and the means for measuring and modifying them, it remains to speak of the agents by which these currents may be brought to bear on the pelvic organs. These agents are called electrodes.

The electrodes are internal and external, and it is of prime importance that they should be well constructed, else they prove bad conductors, and, even though we have secured the proper current and have carefully measured the dosage, our therapeutic aim is defeated through the loss of a great portion of the current.

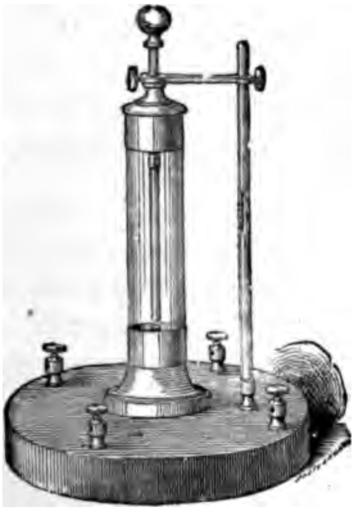

FIG. 9.—THE WATER RHEOSTAT.

The external electrode in general use consists of a sponge imbedded in rubber sheeting to protect the clothing of the patient. This sponge electrode has, however, been rejected by the advanced workers in gynecological electro-therapy for the reason that it is bulky, dirty, and a source of loss of current, owing to the considerable resistance which it opposes to the passage. In its place have been substituted plates of block tin or of sheet lead, which Engelmann has had perforated with holes one line in diameter and one inch apart. These plates, being pliable, readily adapt themselves to inequalities of the surface on which they are applied, and they are covered with a thin layer of absorbent cotton, with chamois, with punk (Engelmann), or with rough towelling. The towelling may be cut in sizes to cover the plates, and is held in place by pieces of tape. A further advantage of these plate electrodes is that the material which covers them may be changed for each patient, a much more cleanly method than the use of a sponge. Apostoli covers the abdomen with a layer of potter's clay, but the plates are much more convenient and fully as effective. These plates should vary in size from four to ten inches in diameter, the general rule as to choice in size being simply that the greater the number of milliampères used, the larger should be the plate, since the wider the external surface over which the current is disseminated the less the pain. Engelmann uses external electrodes with the following measurements:[1] 6¼ by 9¼ inches; 4½ by 6¼ inches; 3¼ by 4½ inches. The smaller electrode he does not use with currents over 20 milliampères; the medium with currents over 60 milliampères; and the larger with currents over this number. Where electrolysis is aimed at, the external electrode should be large enough to cover as great a surface as is possible, in order to effectively disperse the current at the non-active pole, and this object Apostoli attains through the use of potter's clay.

These plate electrodes are in general applied over the abdomen or the sacrum. Where the object is indirect electrization both these regions are covered; where the aim is direct electrization the abdomen is, in general, the preferable site. They should be moistened in warm water in order to increase their conductivity and to diminish the resistance of the tissues, for a dry surface offers greater resistance than a moist. It is customary to use salt water for moistening the electrodes in order to intensify the superficial revulsive effect of the galvanic current. Engelmann rejects this practice, and says:[2] "Salt must be avoided; it is not necessary as it was for the poorly conducting sponge electrode, the instrument which I suggest being a much better conductor, and salt is injurious to patient and to instrument. When used upon electrodes by which currents of high intensity are applied, the electrolytic action of the galvanic current decomposes the salt, and chlorine is developed at the positive pole, by which the amount of pain may be increased and the electrode is corroded." Beard and Rockwell,[1] on the other hand, claim that the use of salt water is an excellent check against the administration of too strong currents, salt water being a much better conductor than simple water, and hence a patient will sensitively feel a current where salt is used which otherwise she would not notice at all. Where, however, a galvanometer is used to gauge the strength of the current, and a large electrode for dispersing it externally, it would seem preferable to dispense with salt, except where we desire the patient to be conscious of the passage of the current for the moral effect, for otherwise in gynecology it is desirable that our manipulations should be as painless as is consistent with therapeutic effect.

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[1] The Use of Electricity in Gynecological practice. *Trans. Am. Gyn. Soc.*, Volume XI.

[2] The Polar Method of Electrotherapy in Gynecology. *Medical News*, May 14, *et seq.*

The internal electrodes are either vaginal, cervical, uterine, rectal, vesical, since it is obviously possible and desirable to utilize all the cavities adjacent or in connection with the pelvic organs for the localization of the electric current. These electrodes should be covered with chamois or absorbent cotton, except where caustic effects are desired.

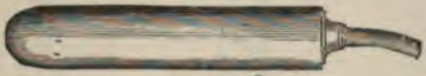

FIG. 10.—VAGINAL ELECTRODE.

The vaginal electrode shown in Fig. 10 is of use for making applications to the walls of this canal, or else we may use a sound (Fig. 11), on the end of which metal balls of various sizes are screwed, this latter form being especially applicable to instances where we wish to localize the current at a special point of the vaginal vault. This same sound with the smaller ball attached may also be used as a vesical or a rectal electrode, and on account of its small size it is peculiarly adapted to virgins. The metal staff may be effectively insulated by slipping a piece of gum elastic catheter or of rubber tubing over it. A convenient rectal electrode has an olive tip (Fig. 12). For the cervix a cup-shaped electrode answers well, and in the cervical canal, where it is patulous, the small ball electrode may also be used.

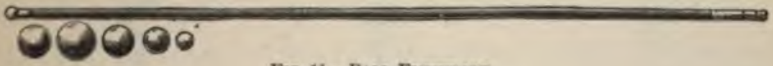

FIG. 11.—BALL ELECTRODE.

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[1] Loc. cit.

For intra-uterine electrization there are a number of electrodes at our disposal. They are differently insulated according as it is desired to act on the entire endometrium or only on the fundus. In the first instance the insulation is to within 2½ inches of the tip, and in the second up to about ¼ of an inch. In certain instances, as will be noted in its proper place, it is desirable to confine the current entirely to the uterus, and then a special electrode is needed. It is in this connection that Apostoli has devised a double or bi-polar electrode, which in his hands has proved serviceable. It contains the two poles, the one carefully insulated from the other. The stem of the electrode is composed of two metallic cylinders, and each appears separately at the extremity of the sound. In Fig. 15 four models are shown, the larger being intended for cases where the uterus is large and its cavity widely dilated. The special ad-

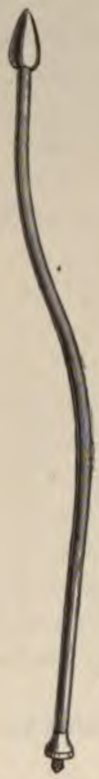

FIG. 12.—RECTAL ELECTRODE.

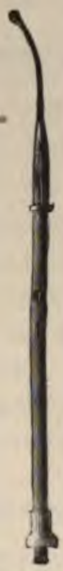

FIG. 13.—INTRA-UTERINE ELECTRODE.

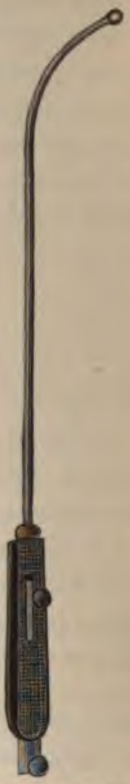

FIG. 14.—BEARD'S UTERINE ELECTRODE.

vantages he claims for this electrode are: "Suppression of the cutaneous pole; concentration within the uterus of the entire electrical action; diminution of pain owing to the absence of any application of the current to the skin; its greater efficacy, since the highest degree of uterine contractility is obtainable with ease and the least pain from the use of stronger currents, of greater intensity, and consequently more active."[1]

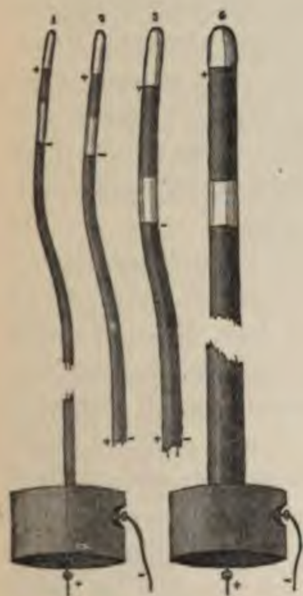

FIG. 15.—APOSTOLI'S BI-POLAR ELECTRODES.

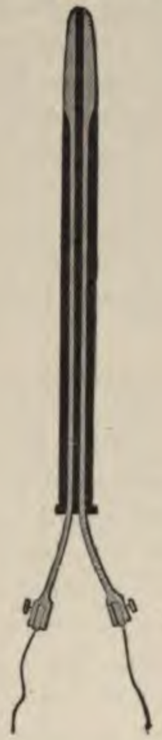

FIG. 16.—TRIPIER'S DOUBLE UTERINE EXCITOR.

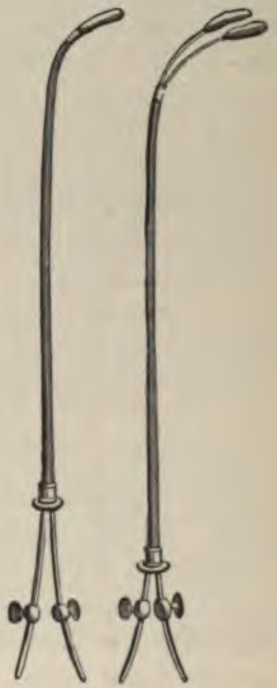

FIG. 17.—DUCHENNE'S DOUBLE UTERINE EXCITOR.

The electrodes are connected with the battery by means of conducting cords of different colors in order that the operator may recognize at a glance the negative from the positive pole. As we have already stated, the poles of a galvanic battery are essentially different in their effects, and their individual properties must ever be utilized according to strict indication. The diagnosis once made the operator should select the pole which he desires to utilize, and the intensity of the current should be drawn from it, the current from the other pole being spread over a large surface and thus neutralized. We are speaking now, of course, of direct electrization, where one electrode is internal and the other external. The electrodes should always be placed in position before the circuit is closed, and they should never be removed until the circuit has been opened. The closing and opening, further, should ever be gradual, the aim being always to avoid unnecessary shock to the patient.

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[1] Am. Journ. of Obst., September, 1884.

Important questions which we must now consider are in regard to the proper intensity of the current and the duration of the application, questions which are in a rather unsettled state, and which further experience is necessary to finally settle. Until quite recently weak currents and long séances were the rule, and have yielded quite satisfactory results. Mundé says,[1] "a mild, steady, absolutely painless current from a galvanic battery will answer every therapeutical purpose, and is in every way preferable to a powerful or interrupted constant current, which causes painful shock and gives positive pain. . . . . . . The faradic current, on the other hand, is effectual exactly in proportion to its strength. . . . . In order to obtain permanent relief, in fact in order to obtain any appreciable relief from galvanism, it must be given often, steadily, and for a long time. . . . . . The sittings should vary from fifteen to thirty minutes each." This quotation fairly well expresses the practice of the majority of gynecologists who have busied themselves at all with electricity. Latterly, however, a number of observers have published results obtained from the use of stronger currents in far less time, and a study of these results forces the conclusion that in gynecology we have been travelling rather more slowly than is at all requisite, for no one will gainsay the assertion that if a given result is obtainable in less time from the use of strong currents these should be resorted to by preference, provided it can be shown that they are painless and do not injure the patient. The electro-therapeutics of the female genital organs are, however, as we have indicated, in a very unsettled state, owing largely to the fact that instruments for precise measurements of intensities are only beginning to be used by gynecologists, and therefore data derivable from experience in the past, when measurements were rarely made and electricity was used empirically rather than scientifically, cannot be utilized for drawing deductions of value. The latest writer on the subject of the use of electricity in gynecology says, "there can be no question but that too weak currents have hitherto been used in the treatment of many of the diseases of the female sexual apparatus. Various conditions which I formerly failed to relieve have of late years responded far more readily to treatment simply because of the greater intensity of current that I have, with increased boldness, attempted."[1] He admits, however, that there is scope for difference of opinion in regard to the number of milliampères necessary to accomplish a given object, and for routine purposes he is for the present satisfied not to exceed fifty milliampères.

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[1] Electricity as a Therapeutical Agent in Gynecology. Am. Journ. of Obst., December, 1885.

Engelmann is the most pronounced advocate in this country of high currents in the routine treatment of the diseases of women, and we instance his views by the following extracts from his recent paper:[2]

"It seems but natural that a current of sufficient intensity to accomplish the desired result in the shortest possible time, without injury to the patient, should be used.

"Hitherto currents altogether too weak to be effective have been used, and to this we must, among other reasons, ascribe the incompleteness of results; it is evident that when a feeble remedy is indiscriminately used, and widely dispersed at that, but little can be expected. Tripier, it may be recalled, speaks of a current of from 8 to 15 milliampères as one of average strength, and calls all over 20 excessive, and Ranney says that 'no patients will endure a current of over 20 milliampères through a high resistance, and that very few will bear over 12 milliampères.' What he calls a high resistance he does not state, and vague assertions such as this merely aggravate the existing confusion.

"How weak the currents used, even by scientific operators, are, is evident from the fact that many galvanometers are not made to register over 20 milliampères, few as high as 40 milliampères, and the highest those of Gaiffe, register not over 50 milliampères.

"To Apostoli is due the credit of boldly passing boundaries which seemed already fixed by practice; in his work hitherto recorded he has used as high as 100 milliampères, and last fall, during my attendance upon his clinic, he had begun to overstep this then most extreme limit, using up to 120 milliampères, and had ordered an instrument which should indicate 150 milliampères. I did the same, but during my winter's work, I found that even this intensity, hitherto unknown in medical electro-therapeutics, seemed insufficient, and that I could accomplish results more readily and more effectively by currents even stronger. As far as I could judge by the limited range of my galvanometer, and by the aid of the rheostat, I had used up to 200 milliampères! I have since obtained an instrument indicating 250 milliampères, and a recent letter from Apostoli informs me that his experience has been precisely similar, which confirms my belief that a wide range of possibilities is open to electro-therapeutics.

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[1] Rockwell: Am. Syst. of Gyn., Vol. I. [2] Am. Gyn. Trans., Vol. XI.

"Such intensities are possible and called for in gynecological electro-therapeutics, where we are generally dealing with circumscribed parts, provided the localized polar method be adopted, by which we obtain low resistance and limitation of the current. I must again emphasize that in all I have said I have had reference to electricity in gynecological practice, and only to galvanic and faradic electricity, not to static electricity, or to large quantity galvanism as used for the cautery.

"I do not claim that such high intensity of current is always judicious or necessary. I sometimes use only 1 or 2 milliampères, often from 20 to 40, more generally from 40 to 80, and merely wish to establish the fact that if desirable, if necessary to accomplish the effect intended, currents of greater strength can be used without injury to the patient, without causing undue pain, and without the use of anesthetics."

These views of Engelmann, re-enforced as they are by the report of numerous cases in which they were practically tested, deserve serious consideration. For the present it may be stated that much stronger currents may be used than have hitherto been deemed safe, and thereby not only is the time requisite for their administration much lessened, but the use of electricity is rendered less irksome both to the gynecologist and his patient. Furthermore, in view of the unquestionable fact that much benefit has in the past been derived from the application of weak currents, the future holds out the hope of permanent relief, in case of certain inflammatory affections of the uterine appendages, from resort to strong currents, something which from other routine measures we have never been justified in predicating. It is sufficiently apparent that definite rules for the choice of low or high intensities cannot be exactly formulated. This is a point which each observer must determine for himself in individual cases. It should ever be borne in mind, however, that electricity must be considered, in its routine applications, simply as an adjuvant to other methods of treatment, and that while some of the agents at present in use may probably be largely dispensed with, there are others which are simply rendered more efficient by the scientific application of electricity. These points it will be our endeavor to exemplify in the discussion of the individual affections in the treatment of which electricity has proved of value.

CONTRA-INDICATIONS TO THE USE OF ELECTRICITY.

In the present state of our knowledge of the electro-therapeutics of the female sexual organs it does not appear advisable to resort to electrization in the presence of any specially acute process. Sub-acute inflammatory affections may be very cautiously so treated, even as care is called for in the application of any of our routine methods. Such, in brief, seems to be the safe position to-day. Engelmann is somewhat bolder. The only strict contra-indication which he appears to recognize is the idiosyncrasy of the patient. He is inclined to think that the opinion that the presence of active inflammation contra-indicates the use of electricity is the result of our as yet insufficient knowledge, and although he nowhere seems to disregard this view in his practice he is evidently hopeful that the future will prove it too absolute. Whether this will prove the case or not, it is wise to-day to limit the application of electricity to chronic processes, and when exceptionally it is tested in the presence of sub-acute processes it should be done with extreme caution, and by preference at the house of the patient, where prolonged rest in bed may be enforced.

CHAPTER II.

THE APPLICATIONS OF ELECTRICITY IN ROUTINE GYNECOLOGICAL PRACTICE.

EVEN as in the choice of any other therapeutic agent, so with electricity is it essential to consider separately the affections in which resort to it is indicated. In so doing we will aim, where possible, at a comparative estimate of the value of this and other therapeutic means in the affection under consideration.

AMENORRHEA.

Under the term amenorrhea are included instances where, between the age of puberty and of the menopause, there is entire absence of the menstrual discharge; or else, if present, where it is scanty and irregular. Aside from pregnancy and lactation, when amenorrhea is physiological, the chief causes are absence or imperfect development of the essential organs of generation, impoverished conditions of the blood or nervous system, certain organic diseases.

Electricity in one or another form has always been a favorite therapeutic agent in case of amenorrhea. It has been used indiscriminately, without, usually, special individualization of the cause of the symptom, and hence, while results have at times been satisfactory, very frequently they have been disappointing. In dealing with the symptom, amenorrhea, with the end in view of relieving it, it is of first importance to estimate the cause, for while certain forms of amenorrhea yield to the persistent application of electricity, in case of others but little hope of relief can be fostered, and in others still positive harm may be done.

Of the instances where electricity is indicated, and yet where it cannot be predicated at all as to what the outcome from its use will be, cases of imperfect development of the essential sexual organs hold the front rank.

Where careful examination, by preference under an anesthetic, satisfies us that the uterus, the ovaries, and the tubes, are present and purely imperfectly developed, then the inference is warrantable that if we can stimulate development we may be able to establish the function the outward manifestation of which is the regularly recurring menstrual flow. There is one factor which considerably aids us in these instances in estimating the probable outcome of the treatment instituted, and this is the presence or absence of molimina. If the woman has never had any of the subjective sensations which accompany the appearance of the menstrual flow—if, in other words, we can gain from her no history which will lead us to think that the sexual system is only dormant, as it were, and only needs stimulus for full development and action—then the outlook for success from the application of electricity or other stimulant and nutrient agents is very gloomy. Still, even here, seeing that we are dealing with the function which chiefly differentiates the woman from the man, however improbable the result, resort to the methods shortly to be indicated is but doing full justice to the woman. It should be stated, however, that these are the instances where the attainment of our aim is highly improbable, and where electricity and other agents scarcely ever yield other than negative results.

A further class of cases where amenorrhea either absolute or relative is present, are those where the essential sexual organs are apparently normally developed, where the history tells us of irregularly recurring molimina, and yet the woman has either never menstruated, or else scantily or irregularly, or else regularly for a while, when, without cause specially apparent, menstruation has ceased. Such instances are to be sharply differentiated into those where the cause is an impoverished condition of the blood or nervous system, or the presence of some organic disease, or else where the only determinable cause, and this an hypothetical one, is a lack of tone in the sexual organs Electricity here may be productive of good or of harm according to the case.

Amenorrhea in the presence of anemia, chlorosis, tuberculosis, or Bright's disease, is not a symptom calling for local treatment by electricity or otherwise, but is rather to be regarded as a symptom which strictly contra-indicates local measures for instituting the flow. The amenorrhea is here, in truth, conservative, for these patients have not the blood to lose. In case of anemia and chlorosis stimulation of the pelvic organs should only be resorted to after the general state has been improved and the blood has been made richer by such constitutional measures as suggest themselves. In case of organic diseases which of themselves undermine the system and sap the strength, we question the utility of resort to any measures which tend to restore or to awaken function in organs which are quiescent to the very advantage of the patient.

We have left for consideration, then, that large class of cases where the amenorrhea is said to be dependent on lack of nerve force or tone, the so-called atonic amenorrhea in which latterly the bin-oxide of manganese has often proved of such marked utility. It is in this class that electrization is most effective and gives the most brilliant results. The patients vary very markedly in their characteristics. At times it is a young girl who presents herself, of eighteen to twenty years of age, that is to say, one who has passed the average pubescent age, of good local and general development, free from constitutional disease or taint, with a history of marked molimina recurring each month, neither anemic nor chlorotic and yet amenorrheic. At other times the woman has previously menstruated normally and with regularity, but has ceased to do so as the result, apparently, of sudden, intense nervous shock, or else on change of residence—a type so constantly met with in emigrants. In both these instances there seems to be lacking the normal stimulus to menstruation, at least such is the hypothetical explanation which we are forced to fall back upon. At other times, finally, the woman, previously regular, notices a gradual decrease in the amount of discharge at the periods and a lengthening in the intervals, until menstruation ceases altogether, and concomitantly with these phenomena there occurs rather rapid development of adipose—that is to say, the stimulus requisite for the regular and proper function of the genital system is apparently diverted towards making fat.

From this rapid survey of the main varieties of amenorrhea, which has seemed essential in order to make clear in what instances electricity is likely to prove of value and in what not, it is apparent that before resorting to the agent strict differentiation of the probable cause of the amenorrhea is requisite. In brief, the statements may be made that: where there is considerable lack of development of the sexual organs and complete absence of molimina we cannot hope for any result from electricity; in the presence of anemia and of chlorosis resort to local electrization, at any rate, is strictly contra-indicated until the impoverished blood has been made richer; certain constitutional diseases (tuberculosis, Bright's) associated with amenorrhea, are *per se* barriers to local electrization; where simply nerve tone is lacking or nervous stimulus is misdirected we can be quite confident of obtaining marked results from persistent, local and general electrization.

Seeing now that those forms of amenorrhea, which may suitably be subjected to electrization, are in general dependent on lack of general or local nerve tone, it is evident that it is on the faradic current that we should place our main dependence. Mechanical effects, not chemical, are essentially called for, and, as we have seen, it is the faradic current which furnishes us these mechanical effects. Such, indeed, is the aim of other methods which are popular in the routine treatment of amenorrhea. The repeated passage of the uterine sound, the application of stimulating agents to the endometrium, the insertion of tents and of stem pessaries, these means all aim at irritating the uterus, at causing congestion, and thereby leading to development and function. There are instances, however, where something more than mere stimulation is called for, where the local nutrition is at fault, and here galvanization, or preferably galvano-faradization, answers a better purpose than faradization alone. Where there exists imperfect development of the uterus and its appendages, cases which test our patience to an extreme degree, there is required, in particular, resort to both forms of electrization. Cases of amenorrhea characterized by the presence of molimina, and instances of relative amenorrhea, where there exists a scanty and irregularly recurrent flow, should by preference be subjected to electrization at the time of the molimina, and for a few days preceding their appearance. It is then that the essential sexual organs are endeavoring to functionate or are imperfectly doing so, and stimulation at this time tends to assist the effort. Where excessive development of adipose is a concomitant factor of the amenorrhea, it is self-suggestive that together with stimulation of the sexual organs means should be taken to correct this tendency to adipoiesis by diet, exercise, etc.

In case of amenorrhea, the sexual organs may be subjected to the electric current either directly or indirectly, and the former is the preferable method. General faradization should also be tested in those instances which do not yield readily to local. The external method of electrization is in particular applicable to virgins, and it should be tested faithfully in them before resorting to local. One pole is placed over the lower part of the abdomen and the other over the lumbar region or the sacrum. This method is never so efficient as the internal, whereby the mechanical effects are more strictly localized. Internal electrization may be resorted to with one pole in the vagina or in the uterus, and the other pole over the uterus and the ovarian regions. The cup electrode may be inserted over the cervix, or this organ may be clasped by an electrode similar to Duchenne's (Fig. 17), or else Beard and Rockwell's method of uterine faradization may be resorted as is represented in Fig. 19.

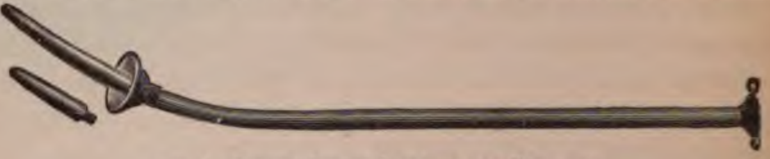

FIG. 18.—BEARD'S DOUBLE INTRA-UTERINE ELECTRODE.

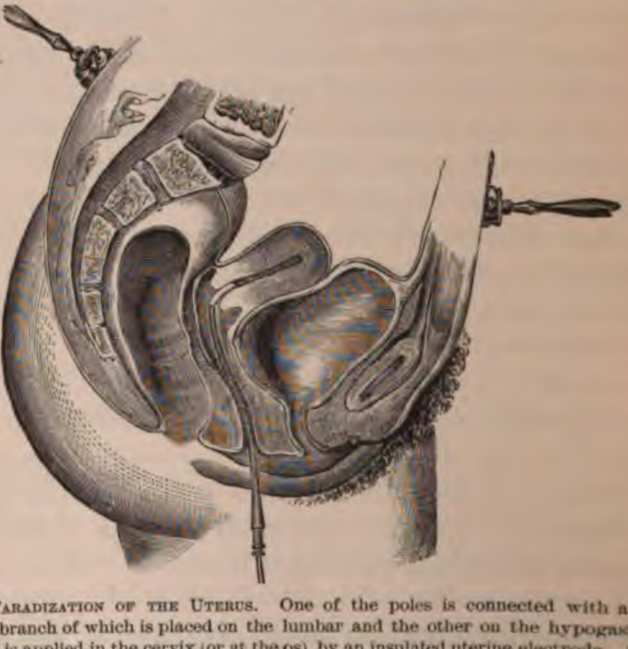

FIG. 19.—FARADIZATION OF THE UTERUS. One of the poles is connected with a bifurcated electrode, one branch of which is placed on the lumbar and the other on the hypogastric region. The other pole is applied in the cervix (or at the os), by an insulated uterine electrode.—(*Beard and Rockwell.*)

Further still, the current may be localized in the uterus by using an electrode similar to the one seen in Fig. 18.

In the choice of these methods, where the faradic current is employed, as in the vast majority of instances it will be, it matters not which pole is internal. Where the galvanic current is used, observers differ in regard to the pole, which by preference should be internal. Rockwell[1] expresses a decided preference for the positive pole as the internal, and he thinks that its superiority over the negative depends upon its more marked influence on unstriped muscular fibre. Engelmann,[2] on the other hand, is in the habit of using the negative pole on account of its decided hemorrhagic property. Probably both poles are useful internally, the positive by preference where there is lack of development of the uterus, and the negative where the organ is developed and needs only further stimulation. Where the negative pole of the galvanic current is used internally, to avoid caustic effects the current should be mild and the séance not protracted.

Local electrization after one or another of these methods will sometimes yield us the desired result in a very short time; in other instances, however, the treatment must extend over a long interval, and even then may fail altogether. Treatment should never be desisted from when the patient is caused to menstruate, but should be continued for awhile until the habit has been acquired or regained. All who have tested electricity in amenorrhea agree that when properly chosen and persistently used it will frequently give us better results, and in less time, than are attainable by other agents. Engelmann calls it *the* remedy, and to his recent papers, as also to the writings of Mundé, Beard and Rockwell, etc., we must refer the curious reader for the record of cases which exemplify the obtainable results.

DYSMENORRHEA.

Painful menstruation is a concomitant symptom of such a large number of diseases of the female sexual organs that any consideration of its relief by electricity or other means must necessarily be deferred till we treat of the individual affections with which it is associated. There are instances, however, where dysmenorrhea exists and yet where careful local examination reveals no appreciable cause, such as displacement or distortion of the uterus, or inflammatory affection of the cellular tissue or peritoneum adjacent to this organ and its adnexa, or changes in the ovaries or the tubes. It is ordinarily in the unmarried that this variety of dysmenorrhea is met with, and for want of a better term the word neuralgic is applied to it. There is present apparently a depressed nervous tone, a lack of nerve nutrition, a local hyperesthesia, which expresses itself in some by neuralgias in various parts of the body and in others by dysmenorrhea. The menses are often scanty, there is non-satisfaction of function, as it were. If we can make these women lose more blood at the menstrual periods, at the same time toning up the nervous system, we can often cure the dysmenorrhea. In other instances, again, the flow is profuse enough and free enough, but still the pain has the neuralgic type. The diagnosis of neuralgic dysmenorrhea must be reached purely by exclusion. Absence of evidence of local disease will point strongly to the pain being neuralgic in character.

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[1] Loc. cit.

[2] Loc. cit.

In the treatment of this variety of dysmenorrhea such general constitutional measures as seem called for by the individual case hold unquestionably the first place. Electricity, however, properly utilized, will serve as a valuable adjunct. The sedative property of the galvanic current is obviously called for, and this is best attained by abdomino-vaginal galvanization, with mild currents; and it seems to us, with the positive pole internal, that its sedative effect may be more directly utilized. In virgins abdomino-lumbar galvanization should be tested before resort to internal. Very exceptionally, and this where the flow is scanty and insufficient stimulus is a probable source of the dysmenorrhea, the faradic current may be tested cautiously, in the hope that with increase in the flow the pain will diminish. In the vast majority of instances of the neuralgic type of dysmenorrhea, however, galvanism is preferable to faradism, and it aims both at sedation and at improvement of local nutrition, on the lack of which the pain in a measure depends. Electrization should, by preference, be resorted to daily, for the week preceding the onset of the flow, and may be depended upon for good results, although general constitutional measures, medicinal and hygienic, in this instance far outrank electricity in value; indeed neuralgic dysmenorrhea very frequently will not yield any more readily or permanently to electricity than it does to other general and local means.

SUB-INVOLUTION OF THE UTERUS AND OF THE VAGINA.

Under the term sub-involution we understand that relaxed, congested state of the uterus and the vagina which is so often met with after labor at term and abortion. The condition is a sub-acute one, as we speak of it here, and has not become chronic, when, as will be noted, electricity should be differently used. We are dealing with a passive hyperemia. The uterus is enlarged, soft, and succulent. It is heavy, and tends to sink down in the pelvis proportionately as its ligaments and the pelvic floor are similarly relaxed and lacking in tone. There exists not alone uterine congestion but also pelvic congestion. The symptoms are intensified when the patient is in the erect or the sitting position, and these symptoms are the result of the congestion which is in turn intensified by the sagging of the uterus. Leucorrhea, menorrhagia, even metrorrhagia, are the outward manifestations of the general pelvic congestion. There is present an endometritis, but it is purely the result of hyper-secretion; it is a catarrhal endometritis, in other words, and not an endometritis characterized by degeneration of the elements of the uterine mucous membrane. We are thus specific in describing the nature of the local conditions, because it is essential to differentiate sub-involution from hyperplasia (chronic metritis), the method of using electricity in the one case differing essentially from that of use in the other.

In sub-involution of the uterus we aim at emptying the organ of its excess of contained blood, at causing it to contract, at rendering it lighter, so that its tendency to sag downwards will be lessened and the peri-uterine circulation in so far improved. It is at once suggestive how amply electrization will fulfill the purpose of adjuvant to our routine measures. Of these routine measures we are able to dispense with one, and this is resort to intra-uterine applications. In the endometritis accompanying simple sub-involution they are unnecessary where electricity is used. The glycerin tampon, for support and depletion, is the measure which electricity markedly supplements.

As to the variety of the current, since we aim at stimulation, at causing contraction, it is obviously the faradic which should be chosen. Further, we wish to stimulate the entire uterus and not to irritate it locally, and therefore faradization should be instituted with one electrode over the cervix and the other over the abdomen, instead of inserting one electrode into the uterus. This at least should be the rule at the outset while the uterus is large, heavy and succulent; later, when the organ is smaller, mild galvanization, vagino-abdominal, may be resorted to for improvement of nutrition. As for the strength of the current, it should be mild, applied for a few minutes, every other day. The result will be noted in gradual diminution in size of the organ and lessened tendency to sagging. In the absence of that factor which so commonly keeps the uterus in a state of congestion, we mean a laceration of the cervix, the result from electrization of the uterus will be marked in a few weeks. At the end of each electrization the vagina should be carefully filled with glycerin tampons in order that in the intervals of treatment the uterus may be held at a slightly higher level in the pelvis, and thereby the uterine and the peri-uterine circulation may be equalized.

It is apparent, and we desire to emphasize this, that electricity is advocated in case of sub-involution, on account of its powerful contractile effects, as a valuable adjuvant to other means for reducing the local congestion. It enables us to dispense with intra-uterine applications, which have always seemed to us of questionable utility in sub-involution pure and simple, and through its relatively speedy action in diminishing local congestion and its general tonic effect on the pelvic organs, resort to pessaries, which aim at sustaining the uterus at a higher level in the pelvis and at taking strain off the suspensory ligaments, will less frequently be necessary.

In case of sub-involution of the vagina, faradization, which is here indicated as well in preference to galvanization, may be suitably applied by means of the vaginal electrode, and since relaxation of the vaginal walls is a fairly constant accompaniment of sub-involution of the uterus, both conditions may be treated at one and the same time. Faradization of the vaginal walls improves their tone, stimulates the muscular fibres, and relieves the congestion here as elsewhere.

While in the treatment of sub-involution, as defined by us, we have laid special stress on the faradic current, and given our reasons therefor, it is necessary to state, that observers are not strictly in agreement, some preferring galvanism, and others a combination of galvanism and faradism. Rockwell, for instance, in his recent contribution,[1] says that in most, if not all cases of sub-involution we must depend mainly upon the galvanic current, although the faradic is by no means useless. He would apply the negative pole internally, and he considers a strength of from twenty to forty milliampères amply sufficient. It is possible that he has in mind cases of longer duration, more chronic, in other words, than those which we are considering. *A priori* it would seem to us advisable to use the faradic current in recent sub-involution, where hemorrhage and leucorrhea were predominant symptoms, and to resort to galvanization, or to galvano-faradization, when the discharges have been lessened and the organ has become denser and less congested. These are questions which as yet the individual observer must settle for himself. In the specific case he will have little difficulty in making his choice of current if he only bears in mind the essential differences between the two, the faradic being contractile and stimulating, the galvanic, while also contractile, being chiefly absorbent and sedative.

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[1] Am. System of Gyn.

SUPER-INVOLUTION.

This condition is the opposite of sub-involution. In the one there is incomplete retrograde metamorphosis, in the other there is excessive. The uterus is smaller than normal instead of larger; amenorrhea, instead of metrorrhagia, is an accompaniment. The amenorrhea need not be absolute, however; there may be a slight periodic discharge of a few hours duration although the uterus is lessened in size, and this is a point which materially modifies the prognosis in regard to the result from the instituted treatment. As long as there is evidence of ovarian activity we may hope for success from persistent treatment. In the absence, therefore, of external manifestation of ovulation, the presence of molimina is a favorable prognostic factor. Obviously the treatment called for is stimulation. This may be secured in a variety of ways, such as by applications to the endometrium, the insertion of stem pessaries, the use of sponge tents, but unquestionably the most direct and powerful stimulant is the faradic current, applied by preference to the interior of the uterus by means of a double internal electrode, or else one electrode externally over the uterus and the other within the cavity. The applications of faradism are called for in particular just before and during the presence of molimina. In the intervals, frequent utero-abdominal galvanization should be resorted to, the negative pole being placed within the cavity to secure the local hemorrhagic effects. Constant treatment of this nature may result in enlargement of the uterus and in restoration of the menstrual periods, for we thus not only stimulate the uterus to growth but the ovaries as well to function. Where the super-involution has existed for some time and there is complete absence of molimina, it is questionable if even persistent electrization will be of benefit, although it should always be given a faithful trial.

CHRONIC OVARITIS AND OVARALGIA.

Under the term ovaritis is understood congestion or the result of congestion of the ovary. The organ, on the bi-manual, is found enlarged, sensitive, possibly at a lower level than normal. It is movable, not fixed. This definition is given for the reason that it is desirable to sharply differentiate simple oöphoritis from that which accompanies pelvic exudations or disease of the tubes. These latter forms will be considered under the head of chronic pelvic peritonitis. The enlarged, tender ovary we are at present considering, finds its analogue in orchitis in the male. For the relief of the condition there is nothing so effective as galvanism, and withal without the unpleasant after-effects which follow on resort to the only other practically effective means—the blister over the ovarian region.

Under repeated galvanization the pain and the congestion are often speedily relieved, and if the condition has not become complicated with pelvic peritonitis, etc., these symptoms may be effectually cured. The current should be mild, the positive pole internal, as near to the ovary as possible for its sedative effect.

Similar remarks are applicable to oöphoralgia, the term which serves as a cloak for our ignorance in those cases where we can determine no appreciable local reason for the pain complained of, and yet which from its site seems to emanate from the ovary. Here, however, sometimes galvanism secures relief from the pain, but in other instances it does not while faradism does. The exact reason for this difference we cannot offer except that a neuralgia of the ovary is simply as erratic as are neuralgias of other organs of the body. Rockwell[1] gives us a guide, in regard to the choice of current, which is deduced from the effects of pressure. Where pressure intensifies the pain he has found that galvanism gives relief, and where the reverse holds true faradism is preferable. This principle in regard to pressure he has found of value in determining the current to be selected for the relief of external neuralgias, and he depends on it in case of ovaralgia. Engelmann has found the galvanic current as chiefly of value in the relief of pain in chronic cases, while a high tension faradic current has seemed preferable in acute cases. The observer will have to test this question for himself in the individual case, beginning preferably with galvanism, and changing to faradism in case of failure.

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[1] Loc. cit.

AREOLAR HYPERPLASIA AND CHRONIC ENDOMETRITIS.

It will be convenient to consider these affections together, since their treatment by electricity by modern methods is very similar. Areolar hyperplasia, the so-called chronic metritis, is ordinarily the result of subinvolution. Exceptionally, however, it is met with in the unmarried and the sterile as the result of repeated congestion. We cannot better describe this condition than in the words of Thomas,[1] to whom we are indebted for the term which correctly expresses the chief alterations in the uterus which accompany the condition. "The condition ordinarily styled chronic metritis consists in an enlargement of the uterus due to hypergenesis of its tissues, especially of its connective tissue, which induces nervous irritability, and is accompanied by congestion. Decidedly the most frequent source of this state is interference with involution of the puerperal uterus. A very large proportion of the cases of so-called chronic parenchymatous metritis are really later stages of sub-involution. Areolar hyperplasia is often induced in a uterus which has once undergone the development of pregnancy, by displacement, endometritis, and other conditions inducing persistent hyperemia. However produced, the condition is one of vice of nutrition engendering hyperplasia of connective tissue as its most striking feature, and, although attended by many of the signs and symptoms of inflammation, it in no way partakes of the character of that process." Clinically the condition is met with under two forms, according to the stage of the affection. In the one, the uterus is enlarged, heavy, more or less succulent. The symptoms are chiefly hemorrhages and leucorrhea. In the other form the uterus is dense, contracted; there is little secretion from the endometrium; instead of hemorrhage, scanty menstruation is a factor; the chief symptoms, however, are the varied manifestations in different parts of the body to which the term hystero-neuroses is applicable. Every gynecologist knows how intractable to treatment areolar hyperplasia is, in its advanced stages particularly, and a proof of this is furnished by calling to mind the many and the varied methods of treatment which have from time to time been proposed. Leeching, scarification, intra-uterine applications of the stronger caustics, igni-puncture, the wedge-shaped excision, etc., etc., these measures have each and all been tested, and still frequently they fall far short of effecting a cure. Revulsion, derivation, absorption, is what they all, in the main, aim at, and from what has gone before it is at once apparent that the fulfillment of this aim may be best secured by electricity. In what follows in regard to the use of this agent, we take it for granted that in the treatment of any individual case any marked irritant and promotor of the hyperplasia, such as a laceration of the cervix, will be removed before resorting to electricity.

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[1] A Practical Treatise on the Diseases of Women.

Hitherto it has been the custom in applying electricity to the hyperplastic uterus, to use by preference the faradic, or the galvanic current, by the vagino-abdominal method, and in the experience of those who have thus utilized electricity the results obtained have very frequently been of the most marked kind. Rockwell says[1] "The very disagreeable symptoms that are so often associated with this intractable condition are occasionally very much ameliorated by the persistent use of the galvanic current. The intra-uterine electrode may be used, but the current must be weak and the applications short, so as to avoid unpleasant electrolytic effects. As a rule, however, extra-uterine will accomplish quite as much as intra-uterine applications. The disadvantage of the applications by the former method that it is not so direct, is more than balanced by the far greater tension of current that can be used when with a large sponge-covered bulb electrode firm pressure is made around and above the os uteri." Mundé says:[2] "As a peculiarity of this condition, which is a very common consequence of sub-involution, is an excessive formation of areolar tissue, which gradually assumes a density similar to fibrous tissue, the object of treatment should be to promote the softening and ultimate absorption of this abnormal tissue. This is best done by long and frequent applications of the galvanic current, which should be passed through every part of the uterus as thoroughly as possible. As menstruation is usually scanty in marked cases of hyperplasia, inta-uterine galvanization is decidedly indicated, precisely the reverse from sub-involution. But as there is no disease of the female reproductive organs more difficult to cure than inveterate hyperplasia of the uterus (Scanzoni, indeed, pronounces it incurable), it is evident that only perseverance will insure improvement. And relapses are frequent. The current should be used as strong as the patient can bear it, twelve to eighteen cells, the negative pole being internal. But it should be borne in mind that the intra-uterine pole is uncovered metal, and that a milder current must be used than when the covered ball merely touches the cervix. A very strong negative current passing from a metal sound might easily cauterize or char the endometrium, and do serious injury."

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[1] Loc. cit.

[2] Loc. cit.

These quotations exemplify the methods after which it has been customary to resort to electricity in case of hyperplasia, and we insert them here in order to bring out more strongly the radical nature of the methods which are favored by Apostoli and Engelmann, which if accepted promise to revolutionize our practice in case of this affection. The importance of these methods necessitates reference to them somewhat in detail.

The first method is that by electro-puncture, which Rockwell is apparently inclined to accept as preferable to the older routine methods, since he calls it "the most speedy and effective method of treating areolar hyperplasia."[1]

Electro-puncture is highly endorsed by Engelmann, and the method may be described in his words.[2] "In chronic metritis and hyperplasia we utilize the absorbent and electrolytic properties of the negative galvanic current and the chemical action of the negative pole; also the contracting and stimulating effect of the faradic currents of quality and low tension. These cases are frequently accompanied by a scanty menstrual flow and dysmenorrhea, hence the hemorrhagic tendencies of the negative pole are of service, as well as its electrolytic and cauterizing properties; the most effective treatment, if there is no contra-indication, is negative electro-puncture: passing a platinum needle into the indurated tissue parallel to the uterine canal, connecting this with the negative pole of the battery, placing the positive dispersing pole upon the abdomen, using a current of from 50 to 150 milliampères. The larger stylet may also be inserted, or four or five needles at a time surrounding the os, all connected with one and the same negative pole. If amenorrhea, painful menstruation, or narrowing of the canal, especially in case of endometritis, accompany the hyperplasia, it is, first of all, important to remedy these conditions, and cauterization takes the place of puncture; that is, the uterine sound connected with the negative pole is used in the cavity, while the positive pole is in connection with the dispersing plate upon the abdomen.

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[1] Loc. cit.

[2] Loc. cit.

"If weaker currents, from 40 to 60 milliampères are used, electro-puncture of the uterus may be repeated every third day; the application of currents of from 120 to 150 milliampères should be from four days to one week apart, as they are accompanied by a slight destruction of tissue, which at first leaves an open canal, but at the end of that time nothing but a slight depression in the cervical tissue at the point of puncture remains. . . . . Positive electro-puncture, the positive platinum pole in the uterine tissue, is to be tried only in case a greater destruction of tissue is desirable, an open canal remaining, through which detritus is discharged. The positive pole is more liable to produce a slough; hence, unless peculiar conditions exist which demand this procedure, the negative pole is far preferable on account of its electrolytic action, absorption is promoted in uterine and peri-uterine tissues, and the usually scant menstruation is increased."

As for the details of electro-puncture of the uterus, the same writer thus states them: "I would recommend that all the precautions advocated in the puncture of fibroids be here observed; but since we cannot fix the uterus as we can a fibroid by pressure of the hand upon the abdomen, I prefer to insert the needle or stylet through the speculum. The uterus is fixed by the bullet forceps, or vulcellum, if the former be not at hand, directly above the point of puncture, and the needle is then forced into the tissue; but since this is so firm that the ordinary platinum needle is liable to give, a somewhat heavier instrument is preferable; although I would hardly recommend the large stylet, as used in the fibroid and in cellulitic effusions. . . . . According to the density of the tissue and the size of the uterus, the stylet for puncture may vary from the size of an ordinary needle to that of a number 1 English catheter, which I call the small stylet, or a number 4, which I call the large stylet, and use in fibroids and parametric effusions. If an ordinary heavy needle be used it should be inserted at least to the depth of one inch, better still deeper. All accompanying symptoms should be carefully weighed before puncture is resorted to. An admirable device, but one rather difficult of execution, is to insert four or five needles at the same time into the cervical tissue in a circle about the os, all connected to the same reophore. After four or five applications, massage of the uterus, the contraction and stimulation by the proper faradic current, will rapidly further the attaining of the desired end."

This method of treatment by electro-puncture has been also highly endorsed by Ménière,[1] of Paris. He has thus treated fully one hundred cases, using, however, the positive pole for puncture. It cannot be questioned that puncture by the negative pole is preferable, seeing that the softening and absorbent effect of this pole is the most marked.

The method of treating areolar hyperplasia by puncture is, to judge from the recorded cases, safe and effective. It would seem, however, peculiarly adapted to those instances where the uterus is markedly indurated, that is to say, in old chronic cases where the greatest possible revulsive effect is desirable. In more recent cases, where the uterus is large, heavy, and menorrhagia and profuse leucorrhea are predominant symptoms, we question if abdomino-vaginal galvanization, or galvano-faradization, will not suffice. In these instances, although experience in the future may prove the assertion erroneous, we should prefer to precede electrical treatment by thorough curetting and cauterization of the endometrium, for the chief source of the hemorrhages and the discharges is the presence of vegetations, fungosities of the endometrium, and it seems rational to remove these radically at the outset, and then to proceed to abate congestion, to cause absorption, and to improve healthy nutrition, by electrization. The time has not come as yet, however, for dogmatic assertion; possibly the method of treating hyperplasia which we proceed to describe will prove, as is claimed for it, so ample in results as to forestall all other methods.

That indefatigable worker in the electrical treatment of the diseases of women, Apostoli, has quite recently called attention to a new method of applying electricity to cases of hyperplasia and of chronic endometritis, giving in detail the *rationale* of the method as deduced from an experience extending over four years. From his monograph[2] we take the following condensed account of the method and the reasoning on which its application depends.

Apostoli's new method aims at utilizing to the greatest possible degree the chemical and the trophic action of electricity, in order to destroy the diseased endometrium and to exert a derivatory effect on the uterus. The routine methods generally resorted to for the cure of chronic endometritis and of hyperplasia one and all aim at altering vicious nutrition, at causing absorption of the hyperplastic tissue, at eliminating the pathological processes in the endometrium. These methods, it is the experience of all, are slow in action, often ineffective, and where efficient this is only after the lapse of considerable time. For these reasons Apostoli has rejected them, and after prolonged experience advocates the substitution of electricity as being, where proper precautions are taken, uniformly safer, and, where the current is properly utilized, as being followed by excellent results.

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[1] Gazette de Gynecologie, February, 1886.

[2] Sur un nouveau traitement de la metrite chronique, et en particulier de l'endométrite par le galvano-caustique chimique intra-uterine. Paris, 1887.

For the purpose of application of this new method, Apostoli uses special electrodes which we will briefly describe. The external electrode, he claims, must possess such qualities as will enable very intense currents to be used without causing discomfort or doing injury to the woman, and these qualities are obtainable by means which diminish to the greatest possible degree the resistance of the skin. In galvanization of the female genital organs it is ever to be borne in mind that they are not specially sensitive to the action of the current, no matter how intense, and that the problem simply is to neutralize the action of the current at the external electrode, which, as we have elsewhere stated, is accomplished by increasing the surface over which the current is disseminated externally. Soft, moist, adhesive, potter's clay is the material which, in Apostoli's hands, has answered best for the external electrode, and by means of it he has been able to triple and quadruple the maximum current which it was formerly deemed safe to employ. This clay must be plastic and soft in order to allow of accurate adaptation to the skin; it must retain its humidity, and the layer must be uniform in thickness and not too thick, else it offers additional resistance to the passage of the current. Apostoli prepares this electrode as follows: In a wooden or metal mould, about 1½ centimetres high, he places a layer of wet tarletan, and then fills the mould with the worked clay exactly to the top. This clay-mass should be large enough to cover the entire abdomen, and before being applied the skin should be carefully examined for abrasions, and if one is found it should be covered with collodion, else the skin will be cauterized at this point. Connection is made with the battery by means of a metal plate fused to the rheophore, and this plate is pressed gently into the clay.

Apostoli's internal electrode, which he calls the *excitateur intra-uterin*, is in shape and size like the average uterine sound. The handle is about four inches long, and is constructed of celluloid, which is not only a poor conductor of electricity but also aseptic in that it does not absorb. This handle slips over the electrode proper so that the surface not in use is thoroughly insulated. This sound electrode is constructed of platinum, an agent which is not corroded when the positive pole is used. Before inserting the electrode into the uterus it should always be carefully disinfected, and it is introduced like the ordinary uterine sound.

In utilizing the chemical galvano-caustic action it is essential to remember the different effects of the positive and of the negative poles. In cases of hyperplasia or of endometritis, where hemorrhage and leucorrhea are marked symptoms, the internal electrode is to be connected with the positive pole, and in the reverse instances with the negative. To express the matter in Apostoli's words: "Although both poles favor retrogression and denutrition in case of uterine hypertrophies, associated with endometritis and congestive parenchymatous metritis, together with this general action there are indications peculiar to each pole: The positive pole, the acid pole, relieves congestion, is hemostatic in the highest degree, is useful particularly in the hemorrhagic, congestive, or ulcerative forms; it prevents the tendency to excessive vascularization, and by the same process it becomes the indirect remedy against persistent leucorrhea; the negative or basic pole, is diffluent, scarcely at all hemostatic, and tends to excite the sluggish or perverted circulation which is present in the old, atrophic, or indurated forms of chronic metritis, and it affects this by powerfully congesting the endometrium. It is the pole to be selected in cases of chronic indurated metritis, whether complicated by amenorrhea or by dysmenorrhea, and it is also applicable with similar success to the treatment of other inflammatory processes in which hemorrhage does not predominate."

Such being the special electrodes which Apostoli utilizes, and such being the reasons for the choice of one or another pole as the internal one, it remains to describe the method of application of the current, the intensity to be selected, the duration of the séance and the frequency of repetition.

The patient should occupy the dorsal position and be cautioned to keep absolutely quiet. The sound electrode is inserted to the fundus, guided by the finger in the vagina, and the celluloid sheath is pushed down to the cervix so as to thoroughly protect the vagina. This electrode is held and steadied by the hand during the entire séance. The layer of clay is uniformly adapted to the abdomen, and the metal plate is pressed gently into it. The rheophores are then connected, and after waiting awhile till all reaction induced by the insertion of the sound has disappeared, the current is very gently and gradually turned on, avoiding all shock. At the first séance Apostoli has found it advisable not to exceed 100 milliampères, but later, when he has tested the tolerance of the patient, he aims as high as 200, even 250 milliampères. During the passage of the current it is very important to keep the entire intra-uterine portion of the sound against the uterine wall, and to bring it as far as possible successively in contact with every portion of the endometrium in order to disseminate and to equalize the caustic action. In general the séance should last from three to ten minutes, the duration depending on the nature of the individual case and on the sensibility of the patient. The true guide to the dosage is the rule never to cause the patient much pain. The séance is ended, even as it began, gently, and avoiding any shock. After the séance, rest for a number of hours should be enjoined, and the patient will very likely suffer from uterine colic for a certain period, and for this reason the post-operative period is often much more painful than the operation itself. As regards the number of séances requisite, Apostoli has found that according to the recent or very chronic nature of the case they vary from three to thirty, the latter figure being only very exceptionally reached. If the patient belongs to the better classes and is able to rest for a sufficient length of time after each séance, she may be subjected to treatment two to three times a week, but where she belongs to the working class once or twice should be the limit.

Owing to the novelty of the method and its radical nature we will reproduce here Apostoli's answer to the objections which might be formulated against it:

"1. *The operation is a difficult one.*—My method being purely a species of therapeutic hysterometry, since it consists only in the introduction of a sound, which remains *in situ* for awhile and serves as the carrier of the current, this objection applies entirely to the introduction of this instrument. Without denying that there are cases where the introduction of the sound is a difficult matter, I may say that, in general, after a little experience, the insertion of the instrument is easy enough, and further it is simply a necessary accompaniment of gynecological practice, since diagnosis depends on the touch followed usually by hysterometry. As for the electrical technique the details into which I have entered should place its utilization within the power of all.

"2. *The operation is a cause of sterility.*—Even if this objection held, I do not think it would have more than a relative importance, and not sufficient to cause us to reject the method; in view indeed of the fact that we are dealing with an affection which *ipso facto* is often associated with sterility, and in view of the further fact that the affection literally often poisons the life of the patient and very frequently does not yield to classic measures of treatment, for these reasons, even though it entailed sterility, my method would be justified. Happily these fears of sterility are very much exaggerated, and for two reasons: I am in the first place able to affirm that sterility is not necessarily entailed, since I know of many cases where pregnancy has ensued after a series of chemical galvano-cauterizations of the endometrium; and then again all gynecologists who are in the habit of curetting the uterus testify that pregnancy may ensue after it. Now what is my method but a galvano-chemical curetting, less brutal and more progressive than surgical curetting, and leading similarly to exfoliation of the mucosa and to its regeneration.

"3. *The operation may cause atresia of the uterus and consecutive dysmenorrhea.*—It is possible, and frequently, that we may witness more or less complete and extensive atresia of the cervico-uterine canal as the result of a series of galvano-caustic intra-uterine applications, in particular the positive, and at the outset I agreed with Tripier in fearing this result; but observation of a large number of patients has taught me that dysmenorrhea was far from following on atresia of the canal, but that usually it was a nervous phenomenon, reflex from the ovaries. I purpose soon to prove this by the relation of numerous cases.

"4. *The operation is dangerous.*—This objection, the greatest of all, is the reflex of our modern gynecological customs, in particular the French; our therapeutics, in Paris, have been largely external and directed against the cervix. Nevertheless it is in France that the process of curetting the uterus saw the light; it is a Frenchman, Récamier, who first scientifically resorted to the procedure, and yet it is in the same country that it is actually least resorted to. Now if my operation is dangerous, *à fortiori* should be curetting, and yet here is what an authority among gynecologists, Carl Schröder, says: 'When resorted to under strict antiseptic precautions, this procedure is without danger. I have curetted and irrigated thousands of times in case of chronic endometritis; only one of my patients died of infection, and she before the antiseptic era. I have sometimes seen exacerbations of an existing perimetritis, but I have never, so to speak, seen this operation result in new inflammatory manifestations.' Remember too that curetting is a surgical procedure, in general badly supported, and that it, says Schröder, 'produces, as a rule, such pain, that it is preferable to administer chloroform, except where the patients are not specially hyperesthetic.' In view of this testimony, and it is in agreement with that of the majority of foreign gynecologists, in favor of a procedure more painful than mine, for I have never been obliged to anesthetize a single one of my patients suffering from metritis, what is the worth of the objection to my method that it is dangerous? Nothing to speak of. What weight indeed could a purely theoretical objection have, when I state that during the past five years I have resorted to galvano-caustic intra-uterine application with perfect security, as well in the treatment of fibroids as of metritis, nearly four thousand times. If there have been accidents, and I have hastened to report them, I alone am to blame and not the method; they were the result of inexperience while I was learning the way. In conclusion, the possible dangers associated with the intra-uterine use of the galvano-caustic properties of the electric current are similar to those that may follow the introduction of the sound, and with reference to this point De Sinety says: 'Many writers have claimed that the uterine sound was responsible for many accidents, but we believe that the operator is at fault rather than the method; this method of exploration in our hands has never been risky, but on the contrary has furnished us very valuable information.'

"The following, briefly stated, are the accidents to be feared:

"a. *The induction of miscarriage.*—If this should happen it is not the method but the operator who is to blame. For this reason conjugal relations should be proscribed during the application of the method of treatment, the first séance should be held as soon as possible after a menstrual period, a careful examination should precede each application.

"b. *Exacerbation of an existing peri-metritis.*—This may depend on the patient, on the operator, on the method: Galvano-cauterization may be resorted to too intensely or too frequently; sufficient attention may not be paid to antisepsis, or the sound may be introduced carelessly; the patient may exert herself too much after the operation, or may be subjected to repeated coitus.

"c. *Acute attack of peritonitis.*—In hysterical women, suffering from ovarian pain, it may happen that an operation, not intense, provokes sharp pains in the abdomen, which simulate to the inexperienced an attack of peritonitis; happily this is the rarest of all occurrences; the more sudden the storm and the more violent, the more readily it ceases spontaneously or yields to simple means, and it is here that my method of uterine, or if need be vaginal faradization, with a current of high tension and long continued, answers so markedly."

We have detailed thus at length this method of Apostoli's because, if it should prove as effective in the hands of others as it has in his, we will possess, what we still lack, an efficient method of treatment of aggravated cases of areolar hyperplasia and of chronic endometritis. As yet he has not recorded any of the numerous instances in which the method has been utilized, and although he makes a strong plea in favor of the method in the monograph from which we have liberally quoted, judgment must be deferred until the record which he promises can be carefully studied.

UTERINE DISPLACEMENTS AND FLEXIONS.

Bearing in mind the properties of the electric current it suggests itself at once that in this agent we ought to find a powerful adjuvant in the treatment of uterine displacements, but it is hardly possible to make any definite statements in regard to its value, seeing that but few observers who have tested it have furnished us with their results. From what has gone before it is evident that where the displacement is the result of subinvolution, seeing that, through the use of electricity we can diminish the congestion and weight of the organ, we may in so far diminish the liability to sagging of the uterus; and further, from what is stated further on, it is apparent that where the displacement is complicated and maintained by adhesions we can through electricity render the uterus more movable; but the real question at issue here is as to whether we are in a position by means of electricity to *cure* cases of displacement where the causal factor is lack of tone and relaxation of the uterine ligaments. If we can do this then certainly a great step in advance has been made, for unquestionably our routine methods, by tampons and pessaries, while they generally palliate the symptoms the result of simple displacements, only very infrequently result in cure. Tripier has been an enthusiastic advocate of electricity in the treatment of displacements of the uterus. He used the faradic current, inserting one pole in the bladder in case of retro-displacement, and in the rectum in case of anterior displacements, his aim being to restore tone respectively to the utero-vesical, and to the utero-sacral ligaments. While theoretically this method seems plausible, we should not expect much from it practically seeing that we are not here dealing with true ligaments in the sense of bundles of muscular tissue, but simply with folds of peritoneum, containing but few muscular fibres, which are hardly susceptible of stimulation in the sense intended. Where the factor is rather a sagging downward of the uterus from relaxation of the pelvic floor, then, likely enough, vagino-abdominal electrization, by restoring tone to this floor, may aid in keeping the uterus at a higher level in the pelvis. This question of displacements of the uterus in reference to the value of electricity can only be answered positively as the result of more careful and general application than has yet been the case. Seeing that the majority of displacements are accompanied by congestive phenomena or their sequelæ, we are at the present, however, justified in looking upon electricity as a valuable adjuvant in their treatment.

As regards flexions of the uterus, although here also positive data from many sources are lacking, we are yet in a position to anticipate permanent results from the use of electricity. We have already seen what a powerful nutrient agent we possess in electricity, and in flexions of the uterus a prime factor in etiology is diminished nutrition of the uterine wall at the site of the flexion. Obviously we have in mind now cases of flexion which are not the result of inflammatory causes exterior to the uterus, but those instances where the distortion is dependent on a weakening, so to speak, of the uterine wall ordinarily at the level of the internal os. In the majority of instances where flexions exist there are complicating factors in addition, and these obviously call for special treatment, and the cases are exceptional indeed where the chief factor is the flexion, when the case presents itself to us for relief. The faradic current is in these rare cases the one which *à priori* should be selected. In case of retroflexion one electrode may be placed in the bladder against the uterine wall, and in case of anteflexion in the rectum, the object being to stimulate the uterus at the site of the flexion. The other electrode should, where possible, be introduced into the uterus. This is the method which Rockwell favors, and it is worthy of trial particularly, because if it succeeds—and we would emphasize the fact that we are by no means in a position to maintain that it will—the method is devoid of all risk, a statement which is not at all applicable to the treatment of flexions by means of the stem pessary. In the absence of sufficient data from which to deduce any justifiable conclusion, we should prefer to divulse the flexion thoroughly, under the ordinary requisite precautions, and afterwards to stimulate the uterus and improve its nutrition by means of intra-uterine faradization.

In regard to prolapsus uteri, seeing that in the vast majority of cases it follows on lesions which call for some surgical procedure, it will rarely be a question of resorting primarily to electricity for relief of the condition. In the lesser degrees of descent of the uterus, following chiefly on sub-involution of the organ and of the vagina, we can unquestionably derive benefit by resorting to electricity for the purpose of diminishing the congestion and of restoring tone to the pelvic floor, and here the faradic current or the galvano-faradic should be chosen. In general, however, the same opinion may be expressed in regard to the value of electricity in prolapsus as held for simple retro- and anterior displacements: while we may palliate the symptoms, we cannot hope to cure.

CHRONIC INFLAMMATORY AFFECTIONS OF THE UTERINE ADNEXA.

Under this term we include the various affections which follow on attacks of cellulitis or pelvic peritonitis—that is to say, those cases where clinically we detect thickening around the uterus, in the cellular tissue or uterine ligaments, (*chronic cellulitis, chronic pelvic peritonitis*), as also those cases where the ovaries and tubes are surrounded by remnants of exudation (*peri-oöphoritis, peri-salpingitis*), and are to a greater or less degree bound down to the floor of the pelvis. In such instances, whether the primary disease emanated from the uterus, or tubes, or the ovaries, or not, the condition is certainly aggravated by these so-called thickenings, and it is against these, in particular, that routine non-surgical methods of treatment have been directed. It must be confessed that, aside from simple chronic cellulitis, these means (iodine, glycerin tampons, the hot douche, etc.), almost always prove ineffectual, and therefore it is why of late years laparotomy followed by the loosening of the adhesions and removal of the tubes and of the ovaries, has been so frequently, in the opinion of many too frequently, resorted to. There is to-day no question of greater importance to woman than as to whether in the instances under consideration there can be palliation short of laparotomy, especially since it is evident to-day that in no given case can it be asserted that laparotomy with its risk will certainly cure. The importance of this subject warrants detailed consideration, for if we can show that electricity can palliate as effectively as laparotomy, in the class of cases under consideration, then there will remain no justification for a measure which a not inconsiderable number of gynecologists are of the opinion has become toö much a matter of routine.

At the outset, let it be understood that the remarks which follow are not at all applicable to cases where there exists an enlarged tube probably filled with pus, for here no one questions the justifiability of laparotomy. We are speaking purely of instances where careful examination reveals only thickening of or in the region of these organs—that is to say where, although the symptoms may be as aggravated, there is no ever-present risk of rupture of what may be termed an abscess into the peritoneal cavity. In other words the results of peritonitis are the main factors we are here concerned with, and to understand the *rationale* of any proposed method of treatment it is necessary to bear in mind the nature of the pathological changes which accompany the condition.

In these chronic inflammatory affections of the uterine adnexa the constant and characteristic symptom is pain, often so intense as to render life unendurable. This pain is largely due to the fact that the essential organs, the tubes and the ovaries, are included in the remnants of exudation, their function being, furthermore, thus impaired, and again the pelvic nervous supply is pressed upon by the same remnants. A further factor uniformly present is pelvic congestion, which, as we have seen, is a frequent source of discomfort if not actual pain to the woman. Notwithstanding these local conditions the women menstruate—that is to say, in accordance with the prevalent view, they ovulate—and therefore, although diseased, these women are not, as is so often stated, incapable of conception, an argument which we frequently hear advanced in justification of a laparotomy which *per se* has sterilized them. The question, indeed, is narrowed down to this, the finding of a method of treatment which will loosen adhesions, cause the absorption of inflammatory remnants, quiet the pain, relieve the local congestion, and at the same time not risk the life of the woman or render her absolutely incapable of procreation. Evidently laparotomy for the removal of the appendages will not satisfy the above aim. Will electricity do so? Be it understood that we are not arguing that there is any method by means of which a *restitutio ad integrum* may be affected; we seek simply for some substitute for the radical operation of extirpation, a substitute, that is to say, which will palliate the local conditions and the symptoms while not unsexing the woman.

A brief recapitulation of the pathological changes which exist in these cases of chronic inflammatory affections of the uterine adnexa will assist us in estimating the probable worth of electricity as a palliative agent. We say palliative, for the reason that in many instances even laparotomy does not do more than this, and therefore we are not justified in speaking of *cure*.

Dr. R. H. Fitz, the Professor of Pathology at the Harvard Medical school, has furnished us with the following description of the *post-mortem* findings in the cases under consideration:

Chronic pelvic cellulitis is indicated by thickening, induration, and deformity (shrinkage) of the pelvic wall, or floor, or broad ligaments.

Chronic pelvic peritonitis is indicated by a superficial thickening, induration, perhaps also shrinkage, of the pelvic peritoneum, with adhesions, cheesy and cretaceous material, or fluid (bloody or serous).

In *chronic pelvic* peritonitis *the tubes* may show little or no change, or they may be shortened, thickened and dense, adherent, dilated or not, with or without contents. *The ovaries* may show no change, or may be indurated, deformed, buried in adhesions, with or without cysts.

In *chronic salpingitis* the tubes are elongated, dilated, varicose, the free end adherent or closed. The walls are thickened, the lining thickened, gray, translucent, the surface smooth or granular. The contents are a watery, yellow, puriform material with flocculi and cheesy masses. This condition may become a hydrosalpinx.

In *chronic oöphoritis* there is thickening, shrivelling, induration of the ovaries, with or without cheesy or calcareous masses. Adhesions are usually associated; the tubes need not be simultaneously affected, but may be.

These views, which emanate from a most careful observer, teach us a number of things. In the first place in any given case we are not in a position to state that the tubes or ovaries are altered; these organs may be imbedded in adhesions and yet be in themselves in a normal condition. Such being the case, and the laparotomist has himself often proved this by showing us specimens which he has removed and yet they were normal, the aim of treatment should be to cause the absorption of these masses of exudation and the loosening of the adhesions, and it should not be directed towards the removal of organs which may be impaired in function but still not diseased. In the second place, we learn from the above considerations, that the woman's life is not imperilled by the conditions in her pelvis, although her life is often made practically unendurable. It follows, hence, that the treatment should be one which, while palliating her symptoms, will not subject her to any more risk than she is at the time under. Obviously laparotomy does subject her to risk, and we therefore must seek some method which does not.

Of the routine methods applicable to the treatment of these chronic inflammatory affections of the uterine adnexa, the persistent tamponade, the hot douche, etc., are scarcely effective, or at best but temporarily so, except where the condition is chiefly a chronic cellulitis. Some absorption of the masses of exudation may thus be induced, but where the changes are chiefly around the tubes and the ovaries, where the condition is mainly a chronic pelvic peritonitis, these methods, it is within the experience of all gynecologists, are not of much benefit, aside from the fact that but few patients are willing to submit to the very protracted treatment necessitated, seeing that we are not able to promise marked and lasting amelioration. *A priori* we should expect speedier and more marked results from electricity, and this is amply proved by a study of the few recorded cases in which this agent has been resorted to. By means of this agent we can unquestionably cause absorption of the inflammatory remnants, and in many instances this is all that is necessary to restore the woman to a state of relative well-being. The importance of this subject warrants us in appending a few illustrative cases taken from various sources, and thereby we also exemplify the manner after which the electricity is applied.

In Beard and Rockwell[1] is recorded the following case: In October,

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[1] Loc. cit., page 541.

1884, Mrs. S., aged thirty-four, came to me complaining of poor appetite, excessive constipation, dysmenorrhea, menorrhagia, sciatica, and partial paraplegia. She suffered in addition from a constant pain in the basilar region and a burning and pressure throughout the abdomen. She called attention also to a constant pain in the lower portion of the spine, while sharp neuralgic attacks in the uterine region contributed to make her life quite wretched. Upon examination I found the neck of the uterus crowded somewhat backwards and to the left side, while the left half of the os uteri was completely obliterated. The enlarged portion was larger than the surrounding tissue, but not acutely sensitive to moderate pressure. Pressure along the base of the swelling and posterior to the os caused greater pain. These objective symptoms, together with a previous history of acute cellular inflammation, rendered it evident that there was extensive exudation in the connective tissue. I therefore determined to subject her to persistent localized galvanization. For nearly a month the patient came every day, with the exception of Sundays, and subsequently she visited me about every other day for three months. The applications were made directly to the diseased part, and when menstruation appeared, some three weeks after the inauguration of the local treatment, the flow was not only markedly less in quantity, but attended by a very considerable decrease in pain. In a few weeks the distress along the sciatic nerve entirely disappeared, and the progress towards a fair degree of health was uninterrupted, until she was discharged as cured, after having received fifty-six local applications of the galvanic current. Under the absorptive influence of the current, the inflammatory exudation gradually disappeared, until in the end the finger could be swept entirely around the neck at its juncture with the body of the uterus. The readiness with which the sciatica disappeared indicates that it was caused by the pressure of the parametric exudation upon the pelvic floor.

Here then we have an instance of cure of what was largely a chronic pelvic cellulitis by the persistent use of galvanism, the negative pole being used internally, and the positive externally.

Mundé[1] reports the following cases, which we select from his monograph as instances of what may be expected from local galvanization, in addition to routine measures, in cases where laparotomy seems to be the only measure offering hope of alleviation or of cure.

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[1] Loc. cit.

The first case proves conclusively what may be achieved in the way of palliation: "Mrs. C. O. S., twenty-seven years; married twice, the second time four years ago; no children, but two miscarriages two years before, both during the same year. After first miscarriage was confined to her bed with fever, and pelvic and abdominal pain for several weeks; this occurred again after the second miscarriage, when she was more seriously ill. Since then she has been confined to her bed during each menstrual period by profuse hemorrhage and severe pelvic pain, has become thin and pale, and is scarcely ever free from distress in the hypogastric region, chiefly on the right side. She had heard a great deal of the present operative tendency, and was in dread of having some disease which would require the removal of her ovaries and womb, more or less, according to the popular idea of these organs. She was extremely anxious for a child, and was willing to do anything but deprive herself of that hope.

I found the uterus immovably ante-latero-verted, and adherent there; in the right broad ligament a well-marked very tender swelling, which was evidently the inflamed and swollen ovary and tube; in the left broad ligament a much smaller and less tender mass. The diagnosis was perfectly plain, and the prognosis equally so. It was a case for removal of the uterine appendages, if the patient was to be relieved from her suffering, which certainly prevented her from enjoying life, and was gradually making her a chronic invalid. I told her so. She asked in reply whether nothing could be done to give her relief, so that she could at least be free from intermenstrual pain and suffer a little less at the periods, and whether it might not be possible for her to conceive at some future time. She said she had come to me because she had heard that I would give her a chance of being relieved before insisting on a capital operation; and she wanted to take that chance if it existed. I told her that I could give her no hope as to a cure (except by operation), little of relief, and still less of conception, but that I was willing to try what palliative treatment would do if she would give me at least three months. To this she assented, and I began a regular course of galvanism every other day, iodoform and glycerin tampons after each sitting, two blisters a month over each ovarian region, hot vaginal douches. Tonics (chiefly iron, which she greatly needed), malt; and at the periods at first one or two suppositories of extract of opium, according to the pain, and hot applications to the abdomen. These latter remedies were used only during two periods. The patient began to improve within a month; the intermenstrual pain diminished; she said she could feel the relief each galvanic sitting gave her. It certainly was not the iodoform which did it, although that may have helped a little. Her appetite improved, she gained flesh, and could walk quite long distances without feeling tired or experiencing pain. There was apparently little change in the local condition, except that the swelling was less tender and softer, perhaps a trifle smaller. The uterus remained immovable. But the general health of the patient improved so much, partly in consequence of the freedom from pain, that after five months of treatment she returned to her home in the western part of the State, with directions to continue the galvanism if she felt the need of it. This, her husband informed me by letter last September, was not the case, since his wife continued "amazingly well" and was growing stout; they were just going on a trip abroad, and would call to see me on their return.

We select the following cases from this same monograph as instances of the beneficial effect of galvanism in cases of chronic pelvic cellulitis and in pelvic peritonitis: "Mrs. A. M., twenty-six years, married five years, childless, came to me from Athens, Ga., because a year previously I had cured her sister of an anal fissure, which, I was informed, had baffled her family physician. Mrs. M. had a history of pelvic inflammation four years before, since which time she had been an invalid, scarcely ever free from diffuse pelvic pains, ovaralgia, sacralgia, bearing down. She also had an anal fissure. She had consulted an eminent gynecologist of this city, who had advised oöphorectomy. I found the uterus retroverted, immovably adherent, vaginal roof solid, cervix low in vagina, vagina short, left ovary prolapsed, adherent, very tender, right ovary not distinctly palpable. I first cured her fissure by dilatation, thinking that possibly some of her pelvic pain might be reflex from the fissure. But while defecation became painless, the peculiar ovarian and supra-pubic pain and the bearing down persisted. So I began to use iodine to the vaginal vault, and iodoform and glycerin tampons. But the patient either did not bear the iodine well, or the pressure of the tampons distressed her. In fact I found that she could never wear more than one small glycerin tampon with comfort. I tried local galvanism, the large sponge first over the abdomen and then over the sacrum, the negative ball in the vagina; ten to sixteen cells, half an hour every other day. A plain glycerin tampon at the end of each sitting. After fifteen sittings the patient had improved so much that she could walk a mile or more, and scarcely ever had any pelvic pain; she wanted to return home, but before discharging her, I yielded to her solicitation to enlarge the external os, which one of her former physicians had told her was contracted, and was the cause of her sterility and dysmenorrhea. I did not agree with this view, but as the patient harped on this point, I though no harm could come by making a shallow crucial incision into the lips of the os, and trimming off the flaps, of course avoiding traction on the uterus, which was still immovable and retroverted. There was scarcely any pain now on pressure in the vaginal vault, and there seemed no danger of relighting the peritonitis of four years before. I enlarged the external os, carefully avoiding traction or dilatation (I had never dared to introduce the probe), and as a result set up a furious pelvic peritonitis which kept the patient in bed for six weeks, and put her precisely where she was before she came to me. As soon as she was able to come to my office, I recommenced the galvanism, and after about a month's treatment she was as well as ever, and was discharged last March, wearing a small, soft rubber Albert Smith pessary, which she thought gave her some support in walking. I gave her directions about the continuance of the galvanism, and have not heard from her since. Hence I infer that she is doing well, as she was of the kind of patients who would be sure to let me know if my treatment had not proved effectual."

The second case is stated as follows: "Mrs. S. B., twenty-seven years of age, nullipara, married five years, who, since a miscarriage four years before, which was followed by a very severe attack of pelvic peritonitis, had suffered from frequent attacks of pelvic pain, which was localized chiefly in the left ovarian region, and had had several exacerbations of peritonitis. She had grown rapidly stout, her menstruation was irregular and scanty (sometimes skipping four to five months), and she remained childless. I found the uterus immovably fixed, the vaginal vault rigid and tense, the left ovarian region exquisitely tender. Careful passage of a probe produced dangerous reaction, so that I never dared repeat it. Hence I have never been able to benefit her sterility. But frequent local galvanization gave such relief, each sitting being immediately followed by absence of pain, that for several months she insisted on a daily sitting. In course of time she improved so much that only once in a while now does she call on me, when her left side feels badly, and I am glad to say that I can immediately relieve her."

Instances similar in their results to the above might be inserted here, but these are sufficient to prove that in the galvanic current we possess a most valuable adjuvant means of treatment in cases of chronic cellulitis and peritonitis complicated or not with salpingitis or oöphoritis. It is also evident that in view of the possibility of thus alleviating the general and the local condition of these patients, laparotomy for the removal of the uterine appendages should not be resorted to before electricity has been faithfully tested, excepting, of course, in those instances where the bimanual reveals marked distension of the tube, a distension which the rational history of recurrent attacks of pelvic peritonitis teaches us is due to the presence of pus (pyosalpingitis). True enough we cannot speak of cure as the result of using electricity, but the accumulating testimony of individual observers points to the fact that neither can we predict cure in these chronic inflammatory affections after laparotomy. To quote the words of but a single operator:[1] "We are concerned now with the one symptom—pain, as a result of disease of the pelvic organs, exclusive of malignant disease. For the relief of pain supposed to be due, we will say, to ovarian or tubal disease, abdominal section is performed. The organs at fault are successfully removed, and the patient makes a good recovery. It may be a case in which both ovaries and tubes are removed, and as the disturbing element of menstruation is eliminated, the patient is encouraged to expect a cure. Three months elapse, and still the patient suffers, not from the old dysmenorrhea, but from a pain more or less constant. She is encouraged to wait patiently; but in some cases, which have probably occurred to all of us, time brings no relief, and pains of some kind persist, varying perhaps in degree at different times, but never entirely absent. There are a few cases in which the suffering after operation is even greater than it was before."

It remains to speak of a further method of treatment of these masses of exudation which has been proposed and is particularly favored by Apostoli: We refer to electro-puncture, and faradization combined with intra-uterine cauterization. Hitherto we have considered purely subacute or chronic inflammations around the uterus, but now we must also deal with acute, for Apostoli is much bolder than certainly the great majority of those who have resorted to electricity in the treatment of these affections, for he does not draw the line at acute processes. In the presence of the acute stage of an inflammatory affection around the uterus, he holds the view that the ordinary palliative means, rest in bed, opium, etc., resorted to, are worse than useless seeing that they effect nothing in the way of cure. In a paper read before the British Medical Association in 1877, he states his practice and the rules which govern him, and this may be summarized as follows: His chief aims are to relieve the pain from which the woman is suffering, and as far as possible to nip the inflammatory affection in the bud. In the acute stage he resorts to faradization under the following rules: He uses the current induced through a coil of long, thin wire, which is a current of tension or an anesthetic current, as opposed to that from a coil of thick, short wire—the quantity current. He thus avoids inflicting any pain on his patient whatsoever. The first applications are vaginal with a bi-polar electrode, and their aim is purely sedative, each sitting lasting from five to twenty-five minutes, according to the interval which elapses before the patient declares the pain lessened. In these applications the greatest gentleness and avoidance of all shock are requisite. The sittings may be repeated twice daily, and before and after each the vagina should be douched copiously with a solution of the bi-chloride of mercury. Such are the rules for the acute stage. When pain and tenderness have been markedly lessened, or the process has become sub-acute, Apostoli proceeds to intra-uterine electrization—that is to say, he counsels us to break without fear of untoward result that gynecological axiom which tells us never to touch the interior of the uterus in the presence of any specially active inflammatory process around the organ. He claims nothing but good results, however, and proceeds as follows: At the outset he resorts to utero-abdominal faradization, that is to say, one pole is in the uterus and the other on the abdomen, using currents of tension and gradually increasing them up to the point of individual tolerance. These uterine faradizations are repeated until there is evidence of decided amelioration in the local condition, when the galvanic current is substituted for the faradic. The galvanization is also intra-uterine, the chemical and stimulant properties of the constant current being utilized, with the end in view of causing absorption of the inflammatory exudation and of checking any tendency to suppuration.

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[1] Jas. B. Hunter: "Persistent Pain after Abdominal Section." (Trans. Am. Gyn. So., 1886.)

In the beginning, short séances, from three to five minutes, and currents up to forty milliampères are recommended. The séances may be repeated twice a week, and after each the patient should be confined to bed for a while. At first the positive pole is the internal on account of its greater sedative property, but eventually the negative pole is substituted for its derivative effects. Throughout this treatment Apostoli emphasizes the strict necessity of careful antisepsis and great caution in manipulation. When the condition has become chronic galvano-puncture is to be joined to galvano-cauterization. In this stage Apostoli claims that the cauterization of the endometrium should be as energetic as possible, and the inflammatory remnants must be subjected to the direct action of the current, which is only possible by means of puncture, utilizing the negative as the active pole. The following are the general rules as laid down by him as applicable to puncture: The procedure being a painful one, it is advisable to administer an anesthetic, although, where the patient is of a phlegmatic temperament and able to bear pain, it is preferable to dispense with anesthesia, since thus we have the sensations of the patient as a guide in regard to the intensity of the current which we may utilize. This intensity will vary from fifty to two hundred and fifty milliampères, and the séance may be prolonged to ten minutes. The number of séances necessary will vary with the case. Apostoli tells us that one puncture will sometimes suffice in case of slight parametritis, while in others ten to twelve may be requisite. While, in general, rest in bed after the puncture is preferable, still Apostoli has thus treated a number of cases without compelling them to desist from their usual avocations. Before resorting to puncture it is essential by careful examination to choose a site where there is no pulsation, and by preference the most projecting portion of the exudation. The depth of the puncture should be about one centimetre, hardly more, for fear of injuring the peritoneum; perfect antisepsis should accompany it; at the termination of the séance the vagina should be tamponed with iodoform gauze. As the result of the puncture an eschar is induced which separates about the eighth day, and a sinus is left whence derivation is procured. This sinus will remain open, according to its depth and extent, for from fifteen to eighty days, and as long as it remains the tamponing with iodoform gauze must be continued.

Such in outline is the method which Apostoli has practised and from which he claims excellent results. Puncture in case of exudations has been tested by Engelmann, who reports a number of instances treated with marked success. Baker, of Boston, reports[1] a single case in which he has tested it, and he states that the result was so satisfactory as to encourage him to give it a trial in other instances.

In weighing the evidence at our disposal, and for the present limiting our remarks purely to chronic cases, the assertion appears warrantable that in electricity we possess a most valuable adjuvant method of treatment of the stubborn affections under consideration, and that in justice to his patients and to his specialty, the gynecologist is in duty bound to test it faithfully and intelligently before resorting to laparotomy, which operation should be made the strict *dernier ressort* except where the physical examination gives unmistakable evidence of the presence of a tumor from the discharge of the contents of which into the peritoneal cavity a peritonitis may be predicated. To make one of these suffering women comfortable, if not to entirely cure her, by means of electricity, redounds more to the credit of the gynecologist than if he sterilizes her and still does not cure her. There is certainly ground for hopefulness that in the treatment of these chronic inflammatory affections of the uterine adnexa electricity will find one of its chief fields of usefulness.

Before dismissing this subject we would refer to an affection of the surroundings of the uterus to which but little attention has been paid and which has been but infrequently described, and this is pelvic lymphangitis and angeoleucitis. The affection has been described by Courty[2] at considerable length, and Mundé[3] has written a paper on the subject. On physical examination the lymphatic glands are detected as enlarged, tender, movable to a greater or less degree according to the amount of complicating cellulitis, and in marked cases the lymphatic vessels may be also felt. For the relief of this lymphangitis there are no means at our disposal more effective than galvanism. In two of the instances recorded by Mundé this agent alone gave permanent relief. The following case taken from his monograph on electricity in gynecology illustrates the affection and the result obtainable from this agent: "Mrs. G., twenty-four years, multipara, was sent me by Dr. Chas. Denison, of Denver, Col.

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[1] Trans. Am. Gyn. So. Vol. XI.

[2] "Diseases of the Uterus," etc., (translated by Agnes McLaren.)

[3] Am. Journ. of Obst., October, 1883.

She complained chiefly of severe and constant sacralgia, dating from an attack of pelvic peritonitis four years before. I found the uterus retroverted, firmly adherent and immovable; the left ovary prolapsed and adherent; behind the uterus a number (five or six) of small, very sensitive nodules, which could be very clearly mapped out through the rectum, and were evidently situated in the retro-cervical cellular tissue. These were evidently inflamed lymphatic glands. No pain was experienced on examination except when these nodules were touched, or the attempt was made to lift up the uterus. I found the patient exquisitely sensitive to all manipulations, for on passing the sound and gently testing with it the possibility of elevating the fundus uteri, she was seized with so severe pelvic pain that I was obliged to give her a hypodermic of morphine. Naturally I refrained from further active measures, and confined my efforts entirely to mild counter-irritant applications (iodine, iodoform, and glycerin) to the posterior vaginal vault, and to relieving the sacralgia by the galvanic current. I passed an olive-shaped electrode into the rectum, connected it with the positive pole, and placed the negative sponge on the abdomen. At times I placed the sponge on the sacrum for the purpose of including the sacral nerves in the current. Rapid improvement followed; the pain soon left entirely, and I could distinguish a decided diminution in size and tenderness of the retro-uterine nodules. The lady came every day at first, and later every other day, from Brooklyn, where she was staying with friends, and returned without the least discomfort, although it was winter. After about twenty sittings she expressed herself so much relieved that she felt she could safely return home. I have not heard from her since, but believe she or Dr. Denison would have informed me if her pain had returned."

HEMATOCELE.—PELVIC ABSCESS.

In place of the treatment of these affections by incision and drainage Apostoli favors resort to electricity. The method he employs is that of galvano-puncture, connecting his needle with the negative pole. He thus utilizes the chemical-caustic quality of the galvanic current in making an opening into these tumors. The opening thus made is, in character, a non-retractile fistula, with tendency to remain open, and is accompanied by the formation of adhesions between the pathological cavity and the mucous membrane of the vagina—the puncture being made at the most salient portion of the tumor into this canal. The chief advantages from this method are that owing to the formation of adhesions, the risk from opening is lessened, and further, the fistula remains patent instead of its being necessary to keep it so. An after-effect claimed for this method is that the nutrition of these pathological cavities is modified and the retrograde metamorphosis is rapid. On the occasion of his report of the method to the *Association Française pour l'Avancement des Sciences* (1885), Apostoli had thus treated a single case of hematocele, and the excellent result obtained by him led him to the following conclusions: The method is safe, quick in action, and modifies the usual prognosis. It is in action double—it has a surgical effect and a medical effect.

The method commends itself as being theoretically a rational one. Obviously further experience is necessary before we can compare it at all with the routine surgical treatment.

HYSTERO-NEUROSES.

This term is in general applicable to those varying symptoms which women complain of at the time of the menopause. and for the relief of which all our routine therapeutic measures are frequently unavailing. Not uncommonly, however, these neuroses accompany hyperplasia of the uterus or inflammatory remnants, and here obviously from what has gone before, in the application of electricity to these conditions the hystero-neurotic symptoms may be ameliorated and even caused entirely to disappear. In connection with this subject Engelmann reports marked instances of relief from the use of electricity. He states:[1] "For the speedy relief of many of the annoying reflex symptoms which accompany uterine disease, the galvanic current is the remedy above all others to be employed. We have no agent which equals it, and in the wonderful relief given lies, as I have already stated, one of the greatest dangers which accompanies the use of electricity; if any result follows, it is complete, and even instantaneous. Freed from suffering the patient believes herself to be well, and acts accordingly; increased exposure or exertion at once brings about that exacerbation of symptoms, a lighting up of slumbering fires, which we so often find in chronic pelvic disease after any slight indiscretion, against which the patient is guarded while cautioned by her pains; but free from these she no longer thinks of the underlying disease which has practically not been in any way bettered by the single application, though it has dispelled all suffering as if by magic. The electric current is the only agent which so rapidly overcomes the neuroses accompanying uterine disease, which are frequently of more importance in the eyes of the patient than the causative morbid condition; hence the value of electricity in gynecological treatment, even when not used for the relief of the local condition, as an aid to such applications as may be made; but where electricity is used for the treatment of the disease itself it serves a secondary, but to the patient far more important purpose —that of relieving her from distressing symptoms." Engelmann records a number of instances where marked relief from the hystero-neurotic symptoms was obtained through the use of electricity. The following case, in particular, where pruritus vulvæ was the form under which the neurosis manifested itself, is worthy of record. It is taken from his monograph on "Electricity in Gynecology," to which we have repeatedly referred: "The patient came under treatment December 2d, having suffered for six years, ever since the appearance of the menopause, since which time she has been more or less constantly under treatment; for months at times in the hospital; eased now and then but never relieved; the apparent cause of the annoying pruritus was a profuse discharge from a partially prolapsed uterus. The dry treatment, bismuth and plain tampons in vagina and vulva, were used with success, and the patient left completely cured in February. March 1st, she returned with aggravated itching, all the symptoms again appearing with increased severity after a cold from wet feet. Neither the former treatment nor any other relieved the ugly and annoying eczema, which covered a space the size of an ordinary sheet of note paper on either side of the vulva. The local condition as well as the suffering of the patient increased, notwithstanding all efforts, and on May 12th, the galvanic current was used. Cotton-covered metal ball electrodes were used, with from 4 to 6 milliampères, the poles being moved about within the surface affected, remaining for perhaps half a minute in one place. At the point of any excoriation excessive burning was caused. On May 14th, when the patient returned, she was improved beyond recognition; the itching had entirely disappeared; she had slept throughout the night, the time during which her suffering was most agonizing before, and the ugly, deep-red surface, covered by heavy patches of the size of a nickel, was now smooth, with the exception of one single slight blotch, which was of a pale brown color and smooth. This treatment was continued on alternate days, and on May 21st she was again discharged, the skin normal, with the exception of a few thin scabs."

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[1] *Loc. cit.*, page 128.

EROSIONS OF THE CERVIX.

Simple catarrhal erosion of the cervix, the cause, whether discharge from the uterus or disease of the vagina, having been removed, will often readily become covered with new epithelium as the result of the application of nitrate of silver solutions. At times, however, especially when the erosion is of a more aggravated type, it is a very difficult matter to start the healing process, and here the galvanic current may prove of utility. In reference to this point Mundé states, "I have found the negative pole of the galvanic battery, applied to the erosion by means of a metal ball, uncovered, sufficient current being used to produce a mildly caustic effect, to have a beneficial influence towards starting cicatrization. Only a few such applications should be made, and as soon as the erosion begins to heal from the edges, finely powdered iodoform, or a solution of nitrate of silver (ʒ i to ℥ i) should be substituted.'

AFFECTIONS OF THE RECTUM AND OF THE URETHRA.

Engelmann has utilized galvanism in case of hemorrhoids and of prolapse of the rectum. In case of the former he states: "In case of smaller hemorrhoidal tumors, as in thickening or prolapse of the membrane, I have used recto-abdominal galvanism, the positive ball electrode firmly pressed against the part to be affected either within or without the rectum; a medium-sized or large plate upon the abdomen as the dispersing negative electrode; according to patient and condition, currents of from 6 to 30 milliampères may be used. Larger hemorrhoidal tumors are treated by positive electro-puncture with the platinum needle. It is one of the few cases in which we use the positive pole in electro-puncture, but it is here desirable on account of its coagulating and destructive effect. In small hemorrhoidal tumors I have used currents of 30 to 40 milliampères with admirable result, and I shall test the treatment in larger tumors, the puncture being made with several needles at the same time." The same writer has also obtained good results from galvanization in case of *prolapsus recti.*

In chronic constipation, as an adjuvant to other methods, electricity has not been sufficiently utilized. Here faradism is of unquestionable value in restoring tone to the torpid intestines.

As regards affections of the bladder and the urethra, simple irritability may at times be relieved by mild abdomino-spinal, or abdomino-urethral galvanization. Where frequency of micturition is dependent on hyperæsthesia of the neck of the bladder, the positive pole may be inserted into the urethra as far as the neck of the bladder. In case of urethral caruncles Engelmann uses galvanism, applying the uncovered negative pole to the growth, a current of from 10 to 20 milliampères being suffitient to destroy them.

STENOSIS OF THE CERVICAL CANAL.

For the treatment of stenosis (including atresia) of the cervical canal the galvanic current would seem, from the testimony of those who have tested it, to be preferable to either incision or dilatation. Engelmann claims that it is the "mainstay of the surgeon." Comparing it with other methods he says: "For the relief of stenosis, acute or chronic, whether of recent date or of years' standing, this method is preferable to all others; it is not only painless, but at once eases if it does not completely relieve such pain as may at the time exist. Compare with it other means of treatment; slow or rapid dilatation, the tent, sponge or tupelo, or the steel dilator. The tent is of little use in a very narrow canal, impossible often, and when used causes great pain, necessitates the bed, and results in hardly more than a temporary dilatation; when applied directly before the menstrual period it gives relief, but it must be used steadily for a time, and such treatment confines the patient to bed, and the result is but temporary. Likewise that of the steel dilator, an instrument which causes suffering at the time, and to be effective confines the patient to her bed. The knife gives comparatively favorable results, but this necessitates a small operation, and cicatricial contraction may even do away with all benefit accomplished."[1] In his hands 100 milliampères have proved necessary for "positive effective action," the negative being, of course, the internal pole. He records a number of cases where stenosis was thus cured. Rockwell also favors the method, but he deems 50 milliampères used for five minutes, ample. In the cases he has thus treated he has found from six to twenty-five applications sufficient to effect a cure.

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[1] *Loc. cit.*, page 112.

Although these statements speak strongly in favor of electricity they do not warrant the inference that the permanent results are at all better than those obtainable from thorough divulsion. The chief advantage, indeed, which the former would seem to possess over the latter, is the fact that it neither requires anesthesia nor rest in bed. The preferable method we think is to divulse and then to improve nutrition by frequent galvanization. In this connection, however, as elsewhere when speaking of electricity as applied to the diseases of women, the time is not ripe for definite statement, since only a very limited number of observers have at all tested the agent.

CHAPTER III.

ELECTROLYSIS.

ALTHOUGH in connection with certain of the subjects already spoken of we have in truth dealt with the electrolytic effects of galvanism, it seems proper to consider this subject separately in its application chiefly to fibroid and ovarian tumors.

Electrolysis is thus defined by Beard and Rockwell:[1] "The term electrolysis is a general one and signifies decomposition by electricity. As such it applies to the electrical decomposition of inorganic as well as of organic substances, and of animal tissues, whether in health or in disease, living or dead. Practically, however, the term is now pretty well restricted, in electro-therapeutical language, to the electrical decomposition of morbid growths, or to parts affected by chronic inflammation, by means of some form of needle electrodes, and, although more or less electrolytic action takes place in all applications of the galvanic current externally or internally, yet the term when applied to any electrical operation is understood to imply that electrolytic action was the leading effect sought for, and that it was obtained by needles, or at least by some form of metallic electrode more or less pointed at the extremity.

"On the other hand, when electrodes with very large surfaces are used, with a view to chemical effect, and the transfer of fluids with absorption, the process is called *catalysis*. Catalysis depends, in part, at least, on electrolysis, and the distinction between the terms, which has been observed by electro-therapeutists is practical rather than scientific. . . . . When needles connected with the poles of a galvanic battery are inserted into a tumor, a three-fold action is produced.

"1. *Decomposition of its fluid constituents.*—Hydrogen and alkalies, soda, potassa, etc., go to the negative, and oxygen and acids to the positive. The special character of these electrolytic phenomena will depend on the character of the tumor, and the rapidity of the action will be proportioned to the relative amount of its fluid constituents. As the body is mostly composed of water, holding salts of potass, soda, etc., in solution, it is a good electrolytic, and in most of the conditions of disease undergoes rapid decomposition. Schirrus and fibroids, when hard and firm, require considerable strength of current, and are electrolyzed with comparative slowness. Erectile tumors, which are almost entirely of fluid composition, can be electrolyzed very rapidly. Although electrolytic action takes place at both poles when inserted in tumors, as when inserted into inorganic substances, yet this action on the whole appears to be the more vigorous and more effective for causing absorption and disintegration at the negative pole, and in practice this pole is usually found to be the more efficacious, although successful results are obtained by the positive pole or by both combined. Epithelioma being largely composed of water also decomposes rapidly. . . . .

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[1] *Loc. cit*, page 66

"2. *Absorption.*—Absorption may be hastened both by the chemical changes that take place, and also by the mechanically irritating effect of the needles and the transference of the anions and cations. This absorption takes place both during and after the treatment. In some cases it is not at all observed during the operation, but goes on slowly for weeks following. Stimulation of absorption is especially marked when electricity acts on hydrocele and cystic tumors. . . . .

"3. *Disintegration and atrophy.*—As a result of the decomposition and absorption, and associated with them, the tissues become dried, separated, shrivelled, and the tumor decreases in bulk and may entirely disappear."

For the purpose of causing the above electrolytic effects a galvanic battery arranged for quantity rather than for intensity is preferred by Cutter, whose experience in the treatment of fibroid tumors by electrolysis is larger than that of any other individual operator in this country. The battery he uses[1] is the Stœhrer, consisting of eight large plates of carbon, and a similar number of zinc, arranged so that the zincs come on the outside, securing by means of these large plates quantity of current as far as possible. Other observers do not lay so much stress on this question of quantity as obtained through large elements. Beard and Rockwell state:[2] "For purposes of electrolysis tension with moderate or fair quantity is required, such as is obtained by a considerable number of elements of medium size." Bartholow says:[1] "For the purpose of electrolysis the battery should have sufficient intensity. The zinc-carbon combination of Stöhrer for portable use is well adapted for electrolysis, the number of elements used not more than twenty, as the electro-motive force required will not exceed the power of this combination. It is held by some of the most experienced operators (Anderson, Duncan, Althaus) that heating power must also be regarded, and hence the larger cells of Stöhrer are recommended, but this statement cannot be accepted without qualification. Smee's elements may also be employed for electrolysis, but Daniell's, Siemen's and Halske's, Hill's, etc., are not adapted for this purpose. The caustic battery of the Partz electric company of Philadelphia is a very convenient and powerful machine, exceedingly well suited to the purpose." Amory, in his recent treatise[2] on electrolysis thus sums up the matter in its application to tumors: "It is assumed that the electrolytical action is due to the interference with cell proliferation; if then the current should be too strong to effect this interference and should

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[1] *Vide* Am. Journ. of Obst., February, 1887, *et seq.*

[2] *Loc. cit.*, page 663.

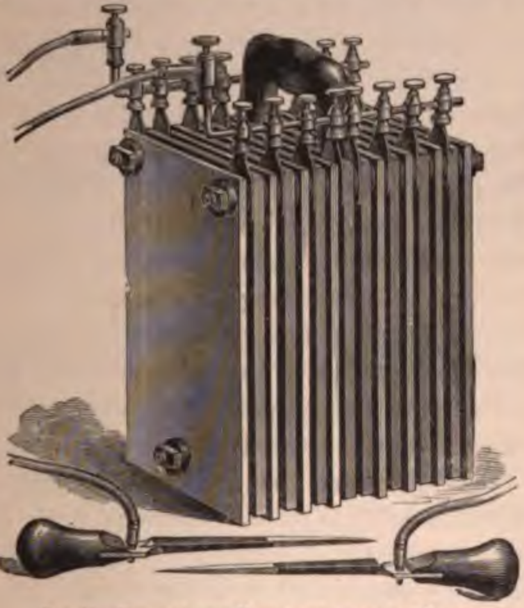

FIG. 20.—BATTERY AND ELECTRODES USED BY CUTTER.

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[1] *Loc. cit.*, page 251.

[2] Wood's Library Standard Medical Authors, 1886.

excite an inflammation, suppuration will ensue and the action of the electricity as a caustic may be localized upon the parts of the tissue immediately in contact with the electrodes. The products of suppuration prevent the transfer of the electrical action to any distance from the point of application. The effect of a localized inflammation in the tissue surrounding a tumor causes the attraction of a larger amount of blood than will suffice for the simple nutrition of the tumor. Consequently as there is an increased amount of nutritive material, the tumor has the tendency to grow larger. For these reasons the strength of current required to effect the slow absorption of tumors should have a feeble tension and small chemical action, and the duration of each sitting should be prolonged." Engelmann and Apostoli, on the other hand, claim that for effective electrolytic action high intensities are requisite, and short sittings are preferable. The former is in the habit of using from 50 to 250 milliampères continued from three to eight minutes.

It is apparent what difficulty there is in making definite statement in regard to the strength of current which it is essential to use in the electrolytic treatment of fibroid tumors. The data for drawing our conclusions are entirely too vague, seeing that operators, with few exceptions, do not state the current strength used in milliampères. Sufficient the statement for the present that results have been obtained both from feeble currents and long sittings, and from high currents and short sittings. This subject is one in which as yet each individual must experimentally work out his own deductions. We shall describe, somewhat in detail, the method advocated by Cutter, and next that favored by Apostoli and Engelmann, in the application of electricity to fibroid tumors. First, however, we must speak of the needles by means of which the growths are punctured. Beard and Rockwell[1] thus describe these necessary adjuncts: "For producing electrolysis in tissues beneath the skin fine needles of gold or gilded steel are used. The advantage of the gold is that it resists oxidation better than any other metal. Gold or gilded needles can, however, be used only with the negative pole, since with the positive they would be acted on. The conductors may be composed of two, four, six, eight or more needles. The needles may be insulated with hard rubber or collodion, or shellac, for about one-third of their length, so that when introduced into a tumor the skin may not be acted on and inflammation excited."

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[1] Loc. cit., p. 664.

Cutter[1] thus describes the electrodes he is in the habit of using: "An ordinary surgeon's director was taken, its point and edges were sharpened, an ebony handle was fitted to the flattened end, and two inches of the larger end were japanned for insulation. The dimensions are as follows: Length of instrument over all, eight and one-half inches; of blade, four

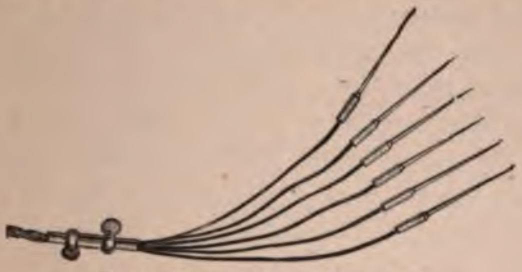

FIG. 21.—CONDUCTOR FOR ELECTROLYSIS.

FIG. 22. – ROCKWELL'S LONG NEEDLE FOR ELECTROLYSIS OF UTERUS THROUGH THE VAGINA OR THE WALLS OF THE ABDOMEN.

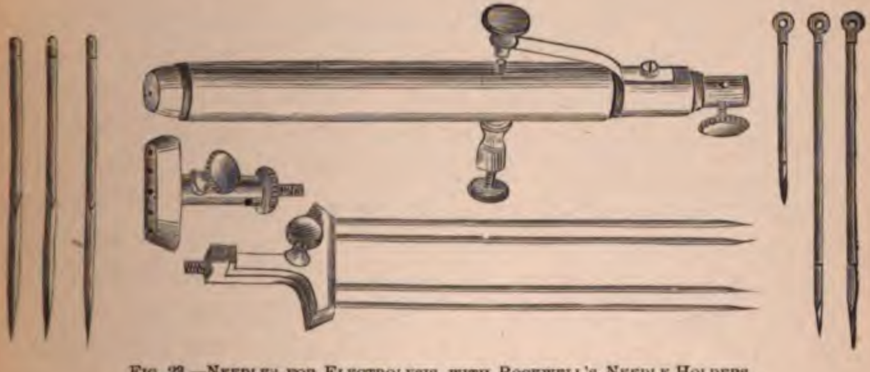

FIG. 23.—NEEDLES FOR ELECTROLYSIS, WITH ROCKWELL'S NEEDLE HOLDERS.

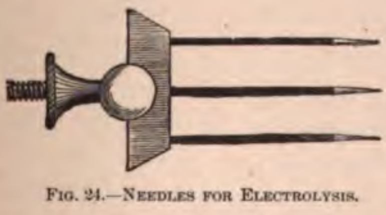

FIG. 24.—NEEDLES FOR ELECTROLYSIS.

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[1] Loc. cit., p. 115.

and seven-eighths inches; width of blade at widest part, three-eighths of an inch. The angle made by the two wings of the blade may be represented in section by the letter V. The point of the angle is made dull. The effect of this arrangement is to draw the tissues over the sharp edges, represented by the free ends of the letter V, and thus cause a ready section of the tissues penetrated. It is evident also, that the union of the two blades at this angle offers a great resistance to bending in any direction." The patient having been anesthetized Cutter inserts these electrodes deep into the tumor. The point of insertion depends on the location of the tumor. "If unilobar and in the cavity of the abdomen, one electrode is passed through the skin in on one side of the tumor, and the other in on the other side of the tumor. Or if the lobe or tumor is small, one electrode may be passed under the other at a distance of half an inch. If the tumor occupies the cavity of the pelvis and has several lobes in the abdomen, one electrode may be pushed in from the rectum or from the vagina, and the other electrode may be passed in through the abdominal walls. If the fibroid is confined to the pelvis, both electrodes are to be introduced through the rectum or vagina. Care should be taken to avoid any strongly pulsating vessel." In Cutter's reported series of cases the applications varied from three to fifteen minutes in duration, and the best results were obtained after the shorter interval. "The length of time was adjudged from the systemic symptoms. If the pulse became accelerated, the respiration hurried, the face pinched, the countenance hippocratic, and the skin sweaty and cold, it was thought time to stop. Etherization masks these symptoms somewhat, and should be allowed for, that is not to push the time too far. The first operation should be short, and, if well borne, the time may be increased in future operations."[1] The applications were repeated once a week, or every fortnight, in certain instances every day. The after-treatment consisted in confining the patient to bed for a few days.

Of the fifty cases recorded by Cutter the following is the *resumé* of the results: in seven cases there was no arrest of the growth; in four cases, there was a fatal result; in twenty-five cases the growth was arrested; in three cases, the symptoms were relieved; in eleven cases, there was cure.

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[1] Cutter, loc. cit.

In the transactions of the American Gynecological Society for 1886, Baker, of Boston, reports the conclusions he has reached in regard to the value of electrolysis in the treatment of fibroid tumors. The method he has followed is essentially that of Cutter and of Kimball, although in a number of details he is at variance with them. He has tested electrolysis in fourteen instances with the result of causing entire disappearance of the tumor once, and in twelve diminution from one-third to one-half. In the remaining instance, although the symptoms were greatly modified, there was no appreciable effect on the size of the tumor. In common with many others Baker does not approve of the form of battery which Cutter favors. He states that "the resistance of the body or of the tumor to the galvanic current being great, all authorities agree that the size of the cells should be moderate, or small and numerous, in order that the intensity of the current may be increased, and thus the resistance overcome; whereas in the battery described (by Cutter) the surface of the plates is so great that the quantity of galvanism generated is large, which is valuable when thermic action is desired, but the intensity of the current is so low that the power of such a battery in conveying a galvanic current through a tumor would be small." He hence uses a Fleming and Talbot battery of thirty cells, and steel electrodes japanned to within one inch of the tip, this being gold-plated. His experience leads him to formulate the following rules: 1. It is best to select a time for resort to electrolysis other than during, or for a week before, the menstrual period. 2. An anesthetic should always be administered. 3. Electrolytic needles should be used for both positive and negative poles. 4. The needles must be absolutely clean. 5. They should be buried deep in the tumor so that the current may be entirely limited to the growth. 6. The needles should be inserted at the most prominent point of the tumor, either through the abdominal walls, the vagina, the interior of the uterus, and the two needles should not be too nearly approximated. 7. The two electrodes being in the growth, one externally and the other internally, it matters not whether the positive needle or the negative is internal. 8. The needles having been inserted, the circuit should be completed, and, beginning with four to six cells, we should within two or three minutes gradually increase the number to from eighteen to thirty cells of an ordinary battery, the number required varying much with the cleanliness of the battery and the freshness of the fluid. 9. The length of time occupied in the application should be from ten to twenty minutes, to be determined by the character of the pulse; and when this is found to be much more slow than normal and weak, the current should be either entirely discontinued, or the number of cells in use diminished. 10. There should be no interruption of the current during the application, and this should be gradually diminished and the circuit opened before withdrawing the electrodes. 11. The application should never be made in one's office, for the patient should always at once be put to bed and remain there for one week.

Baker has never found it necessary to make frequent applications. As a rule he waits a number of months after the first before repeating it. Only in one instance of the fourteen was he obliged to make three applications. Mundé's experience is in the same direction. In a case of large sub-peritoneal fibroid in which he tested electrolysis, puncturing through the vagina with the negative pole, and using a large abdominal electrode for the positive pole, although after two applications the patient refused further treatment, when he saw her about one year afterwards the tumor had disappeared. Freeman, of Brooklyn, is another advocate of electrolysis, particularly in case of interstitial and sub-peritoneal fibroids. He has treated eight cases,[1] and his conclusions[2] are as follows: "All, or nearly all, non-malignant growths of the uterus may be cured by electrolysis without endangering life, if taken at an early stage. I have not attempted to cure in this way those immense fibroids, measuring more than twelve inches in diameter. The kind and form of needle and the manner of introduction are of the greatest importance. That for the negative pole should be of steel, properly tempered, and strong enough not to break, insulated to within one-half or one inch from the point, the whole perfectly smooth and round, and brought to a fine point without any cutting edge. This needle may be passed through any of the tissues without harm, as it separates but does not divide them. It is to be passed through the abdominal wall into the tumor from the most convenient point, always avoiding the intestines and bladder, or, in case of post-uterine fibroids it may be passed through the vaginal wall into the tumor, making sure, in every case, that the un-insulated portion of the needle is entirely buried in the morbid growth. Hydrogen gas collects at this pole and keeps the needle always bright. The positive pole should never be attached to the needle that is passed through the peritoneum into the tumor. It should be attached either to a platinum probe of large size, insulated and inserted well into the cavity of the uterus, or to a slightly curved and insulated platinum needle which is passed through the os uteri and thrust into the base of the tumor. A spring clamp should be used to connect the needles with the conducting wires so as to prevent frequent accidental openings and closing of the circuit. Sixteen to thirty ordinary zinc-carbon cells is as strong a current as I would advise, and from fifteen to forty minutes the limit of time. An anesthetic should always be used, though the patient may be kept very lightly under its influence after the needles are introduced and connection is made with the battery, as the pain is not severe except at the opening and closing of the circuit. It is better to give plenty of time between the operations than to be in too great a hurry. Once, or at most twice, between the menstrual periods is often enough, and in some cases too often.'

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[1] Supplement to Martin's paper read at the seventh annual meeting of the Am. Med. Ass., at Chicago, 1887.

[2] Personal communication

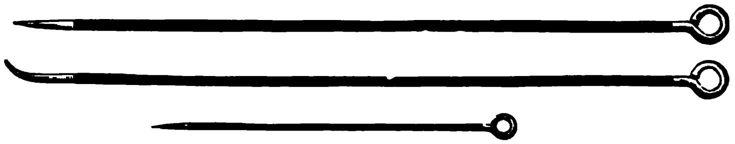

FIG. 25.—FREEMAN'S NEEDLES.

In Martin's paper,[1] three cases are recorded where satisfactory results were obtained without puncture. He used a current of high tension and of small quantity, the negative electrode being placed in the rectum, vagina, or uterus, and the external, the positive electrode, on the abdomen in such a way as to cause the current to pass through the largest diameter of the growth.

FIG. 26.—FREEMAN'S PROBE.

Apostoli and Engelmann pursue a different method in the electrolytic treatment of fibroids. The practice of the former and the results ob-

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[1] Loc. cit.

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puncture *per vaginam*, through the tissue of the cervix if possible, by far preferable to puncture by both negative and positive electrodes through the vaginal and abdominal portion; I object to any puncture through the abdomen, unless the tumor be agglutinated to the parietes, on account of the most unnecessary danger and suffering which invariably accompanies this proceeding. The puncture of such a tumor through the cervical tissue, or even through the vagina, avoids the peritoneum and causes but very little pain. The current can be dispersed by a sufficiently large electrode upon the abdomen, so as to make the treatment very bearable and possible in the office, even if the highest intensities are used. If we puncture through the abdomen an anesthetic is necessary; the peritoneum and abdominal cavity are penetrated, and the danger of inflammation is at hand, as fluid is liable to exude into the cavity. This very serious risk accompanies the abdominal puncture in addition to minor dangers—such as the possibility of opening a large vessel—which we have equally in the vaginal puncture, but which seems to exist rather in theory than in practice, as I have seen no such results. The abdominal puncture assumes the dignity of an operation, necessitates anesthesia, and offers no corresponding advantages over the vaginal method. Among the comparatively small number of operations of this kind performed, cases of peritonitis, perimetritis, and death have occurred. If bi-polar electrolysis is desirable, this may be effected altogether through the vagina; but, as a rule, negative electro-puncture is advisable in preference to bi-polar electrolysis—the insertion of both positive and negative needles into the tumor *per vaginam*—because the pain and danger is diminished by one-half, one puncture being made instead of two.

"In electrolysis an intensity of from 50 to 250 milliampères may be used for from three to eight minutes. All possible precautions must be taken in the first sitting in order to discover any idiosyncrasy of the patient, and a current of 50 milliampères will suffice, attained by slow increase. The patient should lie down quietly for several hours after the application. If an intensity as high as 100 milliampères is used at the first sitting, it is preferable that she remain in bed for the first twenty-four hours, and that a cold compress or an ice-bag be placed upon the abdomen, to overcome any tendency to inflammatory reaction which may occur; hence the attention to details which is necessary, and the precautions desirable in a first puncture, until the sufferance of the individual patient is tested. I have used as high as 250 milliampères in my office, allowing the patient to return home in the street cars after an hour's rest; but such intensities must be attained only by gradual increase, and where we see any indication of inflammatory action the patient should remain in bed for a day or two, using the cold compress or the ice bag. The application is repeated according to the demands of the case and the severity of the treatment once or twice a week. Hemorrhage occasionally follows, sometimes soon after the treatment, sometimes not until six or eight hours have elapsed. This may be either from the uterine cavity the fluidifying effect of the negative pole, or from a large vessel in the line of puncture, which has been temporarily closed by cauterization during the action of the agent.

"On account of the hemorrhagic tendencies of the negative pole, this treatment is only applicable in cases unaccompanied by hemorrhage—a frequent symptom of uterine fibroids; if scanty menstruation, dysmenorrhea, or profuse discharge be present, negative electro-puncture, though not contra-indicated, should be preceded by negative electro-cauterization of high intensity; the uterine sound attached to the negative pole within the cavity, the large plate of the positive dispersing electrode upon the abdomen; we thus achieve an absorbent electrolytic action upon the tumor, though in a less degree, and overcome the co-existing symptoms, favoring an increase of the catamenial flow, overcoming the endometritis, relieving the dysmenorrhea, if any exist. An intensity of from 50 to 100 milliampères should be used, or even 150 to 200 milliampères, if decided action on the fibroid is desired.

"In fibroids accompanied by menorrhagia or metrorrhagia this must be first overcome by positive electro-cauterization of the uterine cavity; a platinum sound as the positive pole in the uterus, a large negative dispersing electrode upon the abdomen. It must not be forgotten that when a metal electrode is used in connection with the positive pole in the tissues it must be of platinum or of gold, lest it be corroded and imbedded in the organ. If high intensities be used this is an absolute necessity; let this be remembered as applicable to the treatment of all possible affections. If the ordinary silver or copper probe be used in the uterine cavity as the positive pole, and a current of only 10 or 20 milliampères is passed, the instrument will be found fixed; and when we attempt to withdraw it after a few minutes, some force is requisite for its removal; if we then examine it we find the surface corroded, roughened, and darkened. This is due to the action of acids which accumulate at the positive pole. Should, by some oversight, a corrodable metal be used in this way, the current is gradually reduced and reversed, and, after a negative current of greater strength has been passed for a time, we can then withdraw the sound with ease. In case of hemorrhagic fibroids the positive electro-cauterization of the uterine cavity with the platinum sound, with a current of from 100 to 150 milliampères, should precede electrolysis proper or negative electro-puncture, until all unusual flow has been overcome. In this treatment of fibroids, where the highest intensities are used, we must apply the electric current with the utmost circumspection, taking into consideration all the accompanying conditions, those most to be guarded against being hemorrhage and inflammation.

"*Method of application.*—I will briefly recall what I have already said as to the method of application, since attention to the minutest details is necessary to success and to the comfort and safety of the patient. The consent of the patient must of course be obtained, as in case of any operative interference, and she should be given an idea of the treatment, that she may not be nervous and restless, but remain perfectly quiet during the action of the remedy. She may be promised that she will receive no shock, which embodies the idea of electricity to the laity, and is what ladies dread most; she can be assured that she will suffer no unbearable pain; that she will experience no discomfort whatsoever within, but that there will be a burning, not excessive, outside upon the abdomen. The corset is removed, the skirts loosened so that respiration may be free, and the abdominal plate, warm and well moistened in simple hot water, is snugly adapted. The patient takes her place upon a gynecological operating table or chair, in the dorsal decubitus, the thighs flexed precisely as for ordinary treatment. The electrodes needed are a gold or platinum sound of ordinary dimensions, and a needle or stylet of the same material (though the steel instrument may be used) well fixed in a firm handle; for puncture through the vagina, this instrument should be of a length equal to that of other gynecological instruments, sound or applicator; for both sound and stylet we must have a separate insulator of heavy rubber, better still of glass, which may be kept more thoroughly aseptic. The abdominal or dispersing electrode is a thin plate of lead or tin alloy, as large as it can be used upon the abdomen, averaging six by nine inches, covered with a thin layer of sculptors' clay, held in place by gauze, or with punk or absorbent cotton and a soft thin buckskin cover, which is equally good.

"The shape which admits of the use of the largest possible plate is the oval, or, better still, the modified form of my plate, oval with convexities to avoid the thighs. This electrode is thoroughly soaked in water as warm as is comfortably borne, and snugly adapted to the abdomen, that it may rest in place a few minutes before treatment is begun, the current then passing more readily, with less pain; the friction, as I may say, caused by the efforts of the electric current to pass the resistance offered by the dry epidermis being possibly a source of pain, certainly lessening the effect of the current by loss of intensity in overcoming the greater resistance. If this precaution is not observed, the operator will find an intense burning during the first few minutes, which lessens, however, as the tissues become soaked; the desired intensity having been attained, notwithstanding that no more cells are inserted into the circuit, the galvanometer will indicate an increase in high intensities of as much as 10 milliampères, and yet the pain lessens decidedly if the positive be the dispersing pole. I have seen it rise from 50 to 100 milliampères, without augmenting the number of cells, when the abdominal plate had not been placed until the last moment, so that the dry epidermis offered a resistance at first difficult to overcome. In other words, when the epidermis becomes soaked, less resistance is offered, more electricity passes, and if the positive be the dispersing pole the pain is lessened by the anesthetic effect of the pole, diminished at times to a minimum, though the intensity of the current be increased. Before placing this plate we must examine the abdomen to see if it shows any abrasions or excrescences; if so they may be covered with a small piece of oiled silk or plaster, as such a spot would be the centre of intense pain if not guarded. An abrasion, a small blister where the epidermis is removed, centres upon itself much of the electric force, which always seeks the best conductor; or if an excrescence, the increased pressure would cause a concentration of the current at this point. The plate having been placed, it is covered by a warm dry towel, or a piece of oiled silk, to guard all garments in contact with it from moisture, which may lead to serious colds, to injury as well as mere discomfort.

"The stylet or sound, whichever is to be used, is steeped in a strong antiseptic solution, as is also the glass or rubber insulator; the vagina also should be cleansed. For electro-cauterization, the sound, covered up to two inches of the point by the insulator, is introduced into the uterine cavity with the utmost care; if possible it is preferable to introduce the sound by the sense of touch. If the stylet is used for electro-puncture, the point of entry having been carefully decided upon, the instrument is introduced, the point guarded by the index finger of the left hand, the handle grasped firmly by the right, counter pressure being made upon the abdominal protuberance. The puncture is then made for a depth of from one to three inches, according to the size of the tumor, the insulating cover is moved close against the vaginal and cervical membrane, and care must be taken that the entire surface of the instrument not in action is guarded. The activity of the battery is now tested, the rheophores are attached to the electrodes and the screws firmly bound; the galvanometer needle must point directly to zero. The abdominal plate, evenly adapted everywhere, is held down with gentle pressure by the hands of the patient, while the operator either fixes the sound or stylet with an absolutely steady hand, or rests it upon some suitable support, as the slightest motion, any jarring of cords or battery, in portable batteries, must be avoided. The patient must breathe evenly and steadily, and allow her hands to follow the respiratory heavings of the abdomen; we must see that the thighs nowhere touch the edge of the electrode, and if perchance the probe is to be passed through a speculum the slightest contact of its metal surface with the pole must be avoided. When any pain or discomfort that may have been caused by the introduction of the instrument has ceased, the current is established and gently increased, in the first sitting, in the course of a minute up to 50 or 100 milliampères; later, when the sensibilities of the patient have been tested, 150 to 200, and even 250 milliampères may be attained in the same time. For very sensitive patients I use the water rheostat, by means of which we can attain the desired intensity, increase and diminish the current without even the slight shock caused by the addition of element after element; a resistance of 500 or 1000 ohms are inserted, the number of cells probably needed thus brought into action, and the intensity gradually attained by decreasing the resistance in the rheostat; for the breaking of the current the resistance is increased until it surpasses the intensity of the elements in the circuit.

"The first sitting should not be continued beyond five minutes, the current remaining at its height three minutes, then being slowly reduced. Currents of 200 milliampères I have continued for eight minutes in later stages of the treatment. During the passage of the current the operator must constantly observe both the galvanometer and his patient. The needle should remain perfectly steady; during the first minute it will show an increase of a few milliampères, but there must be no oscillation which indicates jarring or shock. The face of the patient and the galvanometer must be constantly observed, and the operator must be on the lookout for any evidence of irregularity: a momentary contact of sound and speculum would produce a terrific shock. If the bare sound should touch the vaginal membrane it would burrow its way and leave a grayish bed; if the thighs touch the edge of the abdominal plate, which must always be covered by the overlapping conductor, an intense burning is experienced; if not so covered, a shock; and these shocks are trying if not dangerous with such intensities. The most intense shock is caused by a carelessness, of which no one who ventures upon this treatment should be guilty, the sudden breaking of any one of the connections in the circuit, the dropping of the rheophore from the binding post at the battery or from the electrode, or the moving of one of the switches of the battery. In a portable battery, especial care must be taken lest disturbance be caused, the slightest jar of the battery causing undulations of the current and shock. At the point at which the stylet is inserted, a grayish-yellow foam will accumulate, its mass depending upon the intensity and duration of the current.

"After the full intensity has been attained and continued as long as seems necessary, the current is slowly reduced from cell to cell, with the utmost evenness and gentleness, and the circuit opened when at 0. If the patient be very sensitive we may diminish the current by slowly increasing the resistance by the water-rheostat. When the current has been broken the rheophores are detached and the active inter-pelvic pole is first removed, with the utmost caution; the abdominal plate is then taken off, the speculum inserted, and the vagina cleansed.

"I am in the habit of dusting iodoform over the cervix, and inserting a tampon of salycilated or borated cotton; in case of puncture I use the styptic iron cotton directly upon the point of attack, and pack it firmly to counteract the possibility of hemorrhage as far as possible. The patient should then lie down or go to bed, if at her home, and if not, as soon as she reaches it; but in all events she must rest in the office long enough to thoroughly dry her garments, which are more or less moistened by contact with the electrodes, notwithstanding all care; in cold weather this precaution must be invariably observed, as serious injury may follow neglect. A twenty-four hours' rest is generally all that is needed, but in individuals more susceptible it is well that they use the ice-bag upon the abdomen and remain in bed several days. The inflammatory swelling which sometimes follows is thus best counteracted and most rapidly reduced; but even when it does occur, I have never seen it accompanied by constitutional disturbance or elevation of temperature.

"The puncture should if possible be made through the cervix into the mass of the tumor; if the first is above the os, the next should be below, followed by one to the right and then to the left; if this is not feasible, we seek the point of greatest projection, towards the vagina, avoiding the peritoneum. In some cases a gush of blood, very profuse while it lasts, but not of long duration, may take place within the ten hours following the application, and the patient must be forewarned that she may not be alarmed. The firmly packed iron cotton tampon is the best preventive, but the hot-water injection should also be recommended, as the patient will be much better satisfied to have some means at hand to counteract this apparently threatening symptom.

"I have entered so fully into the mechanical details of the treatment to recall them distinctly to mind, as they are absolutely essential in these cases, and will serve as a guide in all other applications, and once understood I need not enter again and again upon the same points.

"We must always warn the patient of what is coming; we must first apply the dispersing electrode to the abdomen, thoroughly moistened with warm water; we must have the intra-pelvic electrode aseptic, and introduce this with the greatest possible gentleness; we must thoroughly insulate all but the active portion of the instrument, avoiding metallic contact with vagina, vulva or speculum, and never establish the current until all intra-pelvic disturbance has ceased, always increasing the current very gradually, avoiding all pain at the site of the active pole, bearing in mind this most important and invariable law in gynecological electro-therapeutics that *the intra-uterine or intra-pelvic pole must never cause pain; in fact, should not be felt;* upon the site of the abdominal dispersing pole the burning can be lessened by increasing the size of the electrode. All shock must be avoided; the connections made before the current is established, and not severed until after it is broken.'

Beyond this minute description of this method, which we borrow from Engelmann, because he has practically worked it out under the guidance of Apostoli's experience, we are unfortunately in a position to make no positive statement. That the method, when attention is paid to minute detail, is not dangerous or very painful may be accepted as true, and in this respect it has the advantage over double puncture through the abdominal wall. What is wanted, however, is comparative evidence from a large number of observers that the method is effective, and this evidence is not as yet at our disposal. It is not claimed for the method that it will cause the disappearance of the tumors, but only that by means of it the growth of the tumor may be arrested, diminution in size acquired, and the symptoms palliated. If such is the fairly uniform result then obviously this method of electrolysis should be ever tested before subjecting a patient to that most dangerous of all abdominal operations, where the tumor is large, hysterectomy, as also before resorting to removal of the tubes and ovaries for the purpose of inducing early menopause and thus indirectly affecting the tumor. The method has the advantage over the injection of ergot in that, to judge from the reported cases, the effects are more speedy as regards palliation of the symptoms. The time is premature, however, for any further expression of opinion, and will remain so until gynecologists are educated up to the use of such high intensities as Apostoli and Engelmann claim are a *sine qua non*. So far as we are aware no deaths have been reported after the use of this method, while a number are directly traceable to that which is advocated by Cutter, Freeman and others, a method which it should be stated has never inspired much confidence in the profession and in regard to which many of the leading gynecologists have pronounced themselves as opponents.

OVARIAN CYSTS.

The electrolytic treatment of ovarian cysts has been described and practically tested in particular by Fieber, Von Ehrenstein, Ultzmann, Semeleder, and Mundé, and to the latter we are indebted for an elaborate analysis[1] of the recorded cases and for the deductions which have relegated the practice to its proper sphere in surgical gynecology. Semeleder has proved himself one of the most enthusiastic of the advocates of the method, and, were it not that there is a safer method of treatment for these cysts, the cases which he has recorded would justify its general acceptance. In his papers[1] to which we have had access he has reported twenty-seven cases, seventeen of which were completely cured. Similar results, however, have never been obtained by other operators, at least they have not published, for Von Ehrenstein has never substantiated his claim, that of several hundred ovarian cysts subjected to electrolysis nearly fifty were cured. In Mundé's monograph fifty-one cases are collected and analyzed with the following results: Cures, twenty-five; permanent improvement, three; temporary improvement, four; negative result, six; peritonitis with recovery, four; deaths, nine. While no one will question the possibility of curing ovarian cysts by subjecting them to electrolysis, the question to-day is as to whether the method has advantages over ovariotomy when considered in the light of possible dangers and of mortality. When Mundé's analysis was made he was able to draw the following comparison between the two methods: "Notwithstanding these undoubted cures the percentage of success of oöphoro-electrolysis (55 per cent.) compares unfavorably with that of ovariotomy (70 to 80 per cent.); Spencer Wells 78 per cent.—in 1876 as high as 91 per cent.; and so also do the deaths by electrolysis (17.6 per cent.) nearly equal those following ovariotomy in recent years (20 to 30 per cent., to 22 per cent.), and far exceeding those occurring in the last series of fifty-five cases of Spencer Wells." In the nine years which have elapsed since these comparative statistics were given the mortality rate from ovariotomy when performed with the requisite precautions has sunk so low that it has become an operation which *per se* carries with it scarcely any risk at all, except in the highly unfavorable cases in which *à priori* no better result could be predicated from electrolysis. While resort to the method, therefore, cannot by any means be considered unjustifiable, it is none the less true that but few operators of to day would sanction it in preference to ovariotomy.

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[1] Trans. Am. Gyn. Society, Vol. II.

The technique of electrolysis as applied to ovarian cysts does not differ from that usual in other instances where it is resorted to. Semeleder favors steel needles and punctures with the positive pole, applying the negative at some distant part of the cyst. In the instances which he treated the number of séances requisite was from six to one hundred and three, and the treatment extended over from one to nine months. Those who care to test the method, therefore, must supply themselves beforehand with a plentiful stock of patience.

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[1] New York Med. Journ., June, 1876, and Am. Journ of Obst., July, 1882.

CHAPTER IV.

ELECTRICITY IN OBSTETRICS.

ELECTRICITY has never been utilized in obstetrics to the extent to which *à priori* it would seen to be entitled. In treatises on the art reference is here and there made to its value, but the impression ordinarily given to the reader is that however useful the agent might be there is rarely an opportunity to prove this, seeing that the apparatus is not at hand when needed. A glance through the literature of the past few years, however, should serve to prove the advisability of the obstetrician having the agent ever at his disposal, for the multiplied experience of individual observers certifies to the fact that in certain of the complications of labor electricity ought to appear as an adjuvant far more frequently than it ever has. Seeing that the current which it is usually desirable to use is the faradic, the chief objection, hitherto brought against it, that the agent is not at hand when needed, does not hold, for there are a number of induction machines to be obtained to-day which are so small and compact as to be readily carried in the ordinary obstetrical bag. The Gaiffe and its modifications occupy but little space and may be very speedily set in action. A very convenient instrument is the Stanley faradic battery, since it is so readily handled without the annoyance of spilling the fluid. The current may be applied either with one electrode against the cervix and the other over the abdomen or sacrum, or else with one electrode over the abdomen and the other over the sacrum. Baird, of Texas, who is an earnest advocate of the use of electricity in obstetrics, has found the following method advantageous: A copper plate 1½ inches wide and 5 inches long, covered with a wet napkin, is placed over the sacro-lumbar region and connected with the rheophore which belongs to the positive pole. The rheophore from the negative pole is attached to a wrist electrode worn by the accoucheur, so that by means of his hand, which closes the circuit over the patient's abdomen, he is able to note the effect of the current on the uterus.[1] The current may further be utilized by inserting one electrode into the rectum, a method which is peculiarly applicable to ectopic gestation.

In resorting to electricity during labor it may be generally stated that it is advisable to use a mild current and to take the precaution not to pass the current through both poles of the fœtal ovoid. The applications should be intermittent, even as are the normal uterine contractions. The current thus applied cannot be considered dangerous either to the mother or the fœtus, and it will usually evoke or re-enforce contractions.

In considering the applications of electricity in obstetrical practice it will be convenient to make two chief divisions of the subject: Electricity in ectopic gestation, and electricity as an oxytocic. It is unnecessary to do more than note the fact that the agent may prove of utility in allaying the nausea and vomiting of early pregnancy.

Electricity in Ectopic Gestation.

The earliest record of resort to electricity for the purpose of destroying the fœtus developing outside of the uterus is in the year 1853 when Bachetti and Burci used electro-puncture with the faradic current and successfully arrested gestation in the left Fallopian tube.[2] About thirteen years later Braxton-Hicks tested faradization in a case of abdominal pregnancy, of three and a half months' duration, then resorted to puncture of the cyst *per vaginam*, and the patient died a few days later from internal hemorrhage. In 1869, Allen, of Philadelphia, resorted to faradization in a case of abdominal pregnancy at the fourth month with success, and since this date the method may be said to have gradually gained ground, until to-day it has become the accepted procedure in instances of early ectopic gestation. It should be stated, however, that resort to electricity in this connection has remained almost entirely limited to this country. European obstetricians, with the exception of a few English, have held aloof from the method, preferring that by puncture of the cyst or the injection of narcotics, or latterly the very radical means of laparotomy for the removal of the sac (Veit, Tait, Martin, and others). In this country, however, instances have multiplied so rapidly that in the neighborhood of fifty are now on record where electricity has been used with success in ectopic gestation, and at one time or another our most distinguished obstetricians have expressed their belief that it is the safest of all methods of treatment applicable to the anomaly in its early stages. The method indeed would need no defence, and at this date no lengthy exposition, were it not that latterly, owing to the strong operative tendency of the times, there appears to be a desire to substitute laparotomy for it, a substitution for which, it seems to us, in face of the recorded successes from electricity and the greater risk of laparotomy, there is no justification. Thomas, of New York, who has had such an exceptionally large experience in cases of extra-uterine pregnancy, states:[1] "The growing triumphs of abdominal surgery are apt to lead to the conviction that laparotomy should as a rule be the procedure of election in these cases. From this view I unqualifiedly dissent. In the electric current we appear to have an infanticide agent of reliable character, and, as in the woman, as Leopold has proved to be the case in the rabbit, the retained fœtus seems to be readily dealt with by the absorbent process of nature, this should be in the early months of pregnancy (I should say up to the fifth month) preferred to the more radical and dangerous procedure of laparotomy." In another paper the same gentleman says:[2] "It (electricity) has these great advantages; if an error of diagnosis has been made, this remedy will do no harm; if the diagnosis be correct, experience proves it to be sufficient in its effect; it is almost painless, and causes none of the nervous disturbances created by a cutting operation, and it requires no surgical skill in its use."

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[1] Am. Journ. of Obst., July, 1885, p. 741.

[2] For full report of this and the following case see Garrigue's article in Vol. VII. of the Trans. Am. Gyn. Society.

The objections which have been urged against resort to electricity are two in number. In the first place there is liability to rupture of the cyst, and, in the second place, we kill the fœtus and then leave it within the maternal abdomen where it may at any time suppurate and give rise to septicæmia. Both of these objections are purely theoretical, seeing that in the large number of cases in which electricity has been resorted to rupture of the sac has never occurred, nor, so far as we can find any reference, has the dead fœtus become a source of danger to the mother. The only case which would seem to speak against electricity is the one recently reported[1] by Janvrin, of New York, and for this reason we record the essentials here. It concerns a case of tubal pregnancy at about the seventh week, where a delay in the application of electricity was necessitated by the fact that the doctor had engagements out of town; on his return the patient was told about her condition, and that it would be necessary to resort to electricity for the destruction of the fœtus. To quote from the report, "While explaining to her what should be done, she was seized with intense pain in the right hypogastrium, severe vomiting, cold clammy perspiration, extreme pallor and rapid pulse, in fact the usual symptoms of collapse from shock. Hypodermics of morphine and brandy were given at once, and hot applications to the extremities, and after a couple of hours reaction began. I attributed the symptoms to nervous shock, partly the result of the first onset of colicky pains, and partly the result of mental excitement. I could hardly believe there had been any rupture of the sac, although the pallor and faintness seemed to indicate a loss of blood. During the night reaction came on gradually, and by morning there was considerable tenderness over the site of the sac, a rise in temperature to 101°, pulse 116, and still rather feeble, and slight tympanites. There was evidently some inflammation of the tube and broad ligament; but as the patient was gradually recovering from the shock, and the bleeding, if any had occurred, had ceased, the demand for laparotomy, which I had thought the previous evening would be called for within twenty-four hours, had passed for the time being." The localized pelvic inflammatory trouble yielded in a few days, and after consultation it was decided to resort to galvanism to destroy the fœtus. "On the 15th at 4 P.M., the first application was made, Dr. Rockwell applying the positive pole to the abdominal wall, over the site of the tube, and directing the amount of current, while I applied the negative pole *per vaginam*, to the lower part of the growth. Dr. Rockwell writes me as follows in reference to the current: "On account of the localized peritonitis that was supposed to exist, a rheostat was made use of in all the applications, so that the current might be increased to the maximum strength used without interruption, and consequently without shock, and in the same way gradually decreased. The highest strength of current used was about twenty volts," and each of the applications consumed ten minutes. I will add here that this was the twelfth case of extra-uterine pregnancy in which Dr. Rockwell had made use of galvanism to destroy the fœtus, and in all of the other eleven cases the result had been perfectly successful both as regards the mother and the child. The application was repeated on the 16th and 17th. The fœtus was probably killed by the first application, but the two following were made use of simply to make its death perfectly certain. The patient was in good condition and spirits, and during the night of the 17th slept perfectly well, and awoke on the morning of the 18th feeling much refreshed. She had been kept in bed and perfectly quiet since the 9th (the day upon which she had experienced the severe shock), and was guarded very carefully in all respects, so as to avoid all exertion on her part. If there had been any hemorrhage on the 9th it was thought that sufficient time had elapsed between that date and the 15th to allow the surface to heal before galvanism was resorted to. The tenderness and other symptoms of peritonitis had passed away, and all the symptoms seemed favorable for a speedy recovery. Suddenly, at 9 A.M. of the 18th, she complained of feeling very weak, became cold and very pale, and the pulse extremely weak. The nurse immediately sent a messenger for me, but an hour elapsed before I was found and reached the patient. In the meantime a neighboring physician had been called, and he had made use of all the usual means for rallying the patient, but within an hour succeeding the appearance of the symptoms of hemorrhage death had taken place." At the autopsy the sac was found intact, with two large arteries crossing its anterior surface, and a number of smaller branches radiating from them. One of these branches had ruptured at the time of the first appearance of shock, and from this the secondary hemorrhage had occurred to which the patient had succumbed.

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[1] Trans. Am. Gyn. So., Vol. IX.

[2] *Ibid*, Vol. VII.

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[1] Trans. Am. Gyn. So., Vol. XI.

The important question to be answered in the above case is as to what share, if any, the application of electricity had in causing the secondary hemorrhage. We believe that the electric current can hardly be held at all accountable, seeing that it had not been used for eighteen hours prior to the occurrence of the secondary hemorrhage, and this is the opinion expressed by Janvrin in regard to the case. There is, however, a clear moral to be drawn from the report, and this is that stated by Janvrin: "In cases where a moderate hemorrhage has been positively diagnosed (whether from a rupture of a superficial artery or a venous plexus, or from a partial rupture of the sac itself), and this rupture has occurred prior to the termination of the fourth month of gestation, it is undoubtedly better surgery to perform laparotomy at once, and thus remove all possible danger of further hemorrhage, than to trust to electricity in any form." These instances, indeed, may be taken as *per se* contra-indications to resort to electricity, and we question if there are any other valid reasons why the agent should not be used.

Abundant testimony in favor of electricity in the treatment of ectopic gestation might be here inserted, but it is unnecessary to do so since American obstetricians will nearly as a unit support the following proposition: Prior to the fourth month of gestation, in the absence of symptoms pointing to rupture, electricity is the agent *par excellence* in treatment, being safe, effective, and neither at the time of application nor afterwards subjecting the woman to special risk. When laparotomy has become so safe a procedure that all women subjected to it recover, then it will be time enough to follow the course advocated among others by Tait and Martin and remove the cyst as soon as it is discovered.

The use of electricity in ectopic gestation being considered as amply justified by its fruits, it remains to speak of the preferable current and of its manner of application. Either faradism or galvanism may be used to kill the fœtus. The former is decidedly more convenient seeing that the apparatus is more portable, but it has the disadvantage of not being so pleasant to the patient in that it shocks her. It has been used successfully by Allen, Garrigues, Lusk, Reeve, Landis, and others. The interrupted galvanic current has been resorted to by Mundé, B. Emmet, McBurney, and others, but in Mundé's case it is questionable if the rapid interruptions were not responsible for the deep shock into which the woman was thrown for a number of hours. Rockwell, however, favors this current, and in all his cases he has used it in the strength of from ten to twenty milliampères. He believes that "there may be an advantage in its rapid increase by means of a rheostat. In this way the chemical and the physiological effects are greatly increased, without the disagreeable effects and even the danger that might accompany an interruption of the same strength of current. The danger to be apprehended from an injudicious application of the faradic or the interrupted galvanic current is the possibility of rupturing the over-distended tube."[1] This possibility, although such has never as yet resulted, should ever be borne in mind, and therefore we question if it be not wiser to use the continuous current alone, aiming at the desired result rather through electrolysis than through actual shock or this combined with the electrolytic action. Rockwell further claims that galvanism is preferable to faradism since it is more certain in action and more penetrating, and also since it has greater influence on the process of absorption. No one, however, should be deterred from resorting to faradism in the absence of a galvanic battery, and it should be stated that in at least six cases a one-celled faradic machine was sufficient to destroy the fœtus.[1]

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[1] Am. Syst. of Gyn., p. 406.

An important question to be still answered is as to whether electricity should be resorted to in ectopic gestation when this has advanced beyond the fourth month. Hitherto this has been about the limit of its application, and Thomas considers that at this period laparotomy, or, if the tumor be low in the pelvis, elytrotomy, is preferable to electricity, which after the fourth month leaves a fetus of considerable size to undergo absorption. It may be fairly assumed that the fœtus can be killed by electricity as well after as before the fourth month of gestation, and it will probably be uniformly granted that in cases of ectopic gestation we are fully justified in taking no account of the life of this fœtus, seeing that it is growing outside of its normal place to the imminent risk of the mother. The point to be settled then is as to the relative risk of laparotomy and from leaving such a large body as the fœtus is after the fourth month to be absorbed within the mother's abdomen. Garrigues answers this question as follows: "In order to form an idea if it would be advisable to attempt the destruction by electricity in the middle and last part of extra-uterine pregnancy, we must consider the chances for mother and child if we let pregnancy go on unchecked. The cyst may burst at any time, and, although not absolutely fatal, this accident jeopardizes in the highest degree both lives concerned. Laparotomy may be undertaken at the end of thirty-two weeks, when the child is viable, as recommended in abdominal pregnancy by Gusserow, or in the tenth lunar month as preferred by Litzmann. But how miserable the prospects of success by these operations are appears from the excellent article of the latter, in which he has collected ten operations performed while the fœtus was living. Of these ten only a single mother (Jessop's case) recovered, and only four of the children survived, if, by a surviving child, we understand one who lives more than a few hours or days. To Litzmann's list may be added a case of Lawson Tait's and one of Neftel's of Stockholm, both ending in the loss of the mother and the recovery of the child. Thus it would seem that there is a small chance for the child and hardly any for the mother to be saved by the operation at or near term. On the other hand, Litzmann has collected thirty-three cases of laparotomy after the death of the child, of which seventeen, or more than one-half, recovered. Would it not, therefore, be not only justifiable, but wise and humane, if possible to kill the fœtus by electricity, whatever its degree of development may be? We know that there is a fair chance that it will be entirely absorbed, except the bones, or become mummified. Among many other cases I shall only quote two recently observed by Matthews Duncan in which the fœtal heart was audible. The fœtus died before it had reached the term of viability, and both patients were well at last accounts. But even if the worst should come to the worst, and the fœtal sac suppurate, causing septicæmia, there would still be a fair chance of recovery by laparotomy, and at all events, an infinitely better chance than by laparotomy performed during the lifetime of the fœtus. The chances will even be better than in those cases in which suppuration sets in after the end of gestation, for the smaller the fœtus and its envelopes the less trouble is to be anticipated."[1]

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[1] See Garrigues' article, loc. cit.

Although, so far, Garrigues stands practically alone in his advocacy of electricity at a later stage of gestation than the fourth month, it must be granted that the argument, as he puts it, is a very forcible one. The risk to the mother unquestionably increases as the fœtus approaches term, and should the sac not rupture at this time when the attempt at labor is made, the likelihood of absorption of the fœtus with safety to the mother is probably less than when the fœtus had not attained its full stage of development. The answer to this question, however, must be left to the future. Expectation after the fourth month has certainly not yielded results at all to be proud of, and seeing that the ectopic fœtus may strictly be looked upon as an ill-omened parasite, the conclusion may become general that it is proper to kill it at any stage of its development when by so doing the risk to the mother is at all lessened.

As for the manner of applying electricity to the sac, this should always be looked upon as an operation which may be followed by shock, and therefore it should be instituted only at the patient's house, or in a hospital where rest in bed is practicable. It is customary to apply the negative pole against the cyst either *per rectum* or *per vaginam*, according as it is better accessible by one or another of these channels. The ball or olivary electrode will answer very well for the internal pole, while the external, positive, electrode should be placed on the abdomen as nearly as possible over the cyst. While the fœtus may be killed at the first séance, it is advisable to pass the current daily until diminution in the size of the cyst and cessation of the signs of pregnancy vouch for the fact that the desired aim has been attained, and further when the galvanic current is the one employed, absorption is unquestionably favored by repeated recourse to it.

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[1] Loc. cit., pages 215, 216

A possible result from the use of electricity, to which reference should be made, is the conversion of an ectopic (interstitial) gestation into a uterine.[1] This is hardly likely to occur, however, in any other variety of ectopic gestation.

ELECTRICITY AS AN OXYTOCIC.

In passing to the second division of our subject, which, broadly speaking, concerns the utility of electricity as an agent for re-enforcing or awakening uterine contractions, we are justified in taking for granted the acceptance of the statement that electricity is able to cause contractions of the uterus, either indirectly through the effect of the current on the nerve centres which innervate the organ, or else directly through stimulation of its muscular substance. On this point there seems to be no scope for difference of opinion. The question to be settled, tersely stated, is this, Has electricity any advantages over the routine methods at our disposal in those conditions in which stimulation is called for? If it has not then it is scarcely worth the obstetrician's while to burden himself with an additional instrument; if it has, then, in view of the fact that in certain emergencies even the most reliable means may fail, any number of additional ones should be welcomed.

It would be a thankless task to burden these pages with a record of the diverse opinions which have been expressed in regard to the utility of electricity as a means of stimulating the uterus to contraction or of restoring tone to it when its energies are flagging. We will consider the subject rather from its clinical than its theoretical side, in connection with the two conditions in which electricity may *à priori* claim to be indicated, and particularly in comparison with those measures which are matters of accepted routine.

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[1] Mundé: Appendix to Cazeaux and Tarnier.

The two conditions in which we are called on to re-enforce or awaken uterine contractions are: Uterine inertia, the induction of premature labor.

Uterine Inertia.—This condition, broadly speaking, may be present during either of the three stages of labor, or may follow at a variable interval on the completion of the third stage. We will briefly consider the cause of the inertia during these separate periods, and thus endeavor to deduce the indication, if it exist, for resort to electricity.

During the first stage of labor, under the usual normal conditions, that is to say, given a parturient canal of sufficient size, a fœtus presenting favorably, and the absence of pathological alterations in the soft parts, a prime cause of ineffective uterine contractions is exhaustion of the parturient. What is needed here then is rest for the uterus rather than stimulation. In this stage, therefore, resort to electricity will as rarely be called for as, in the opinion of leading obstetricians, are other oxytocics, such as massage and ergot. In this stage, while the labor is otherwise progressing normally, time and patience will be of greater advantage to both the mother and the child than resort to any uterine stimulant. In the second stage of labor the conditions are somewhat different. Dilatation of the cervix once completed, it may be considered of positive advantage to end the labor as soon as possible without resort to means which are meddlesome or fraught with danger to either the mother or the child. Here then stimulation of the uterus and of the abdominal muscles, while of direct assistance to the parturient, is not at all open to the charge of interfering with the natural forces, but on the contrary, may be looked upon as a desideratum. At this juncture then we may properly consider the value of electricity in comparison with other means of assisting the mother. Resort to ergot is common enough still during the second stage, notwithstanding the fact that prominent obstetricians reject the drug prior to the completion of the third stage of labor. Unquestionably ergot will re-enforce the contractions, and will not always by any means be attended by those tetanic contractions which imperil the life of the child, or, after its birth, may interfere with the due completion of the third stage of labor. In view, however, of these possible consequences, it seems wiser to reject ergot in the second stage. Massage and compression of the uterus are further means, and, in general, effective ones, of re-enforcing the contractions during the stage of expulsion. The method by massage and compression, however, is tedious, and the compression, if persisted in, becomes annoying to the patient. Electricity, on the other hand, is not open to the objections which attend the use of ergot. None of those who have used it, as far as we have been able to discover, have found that the agent tetanizes the uterus, and so far from the patient complaining of the applications, she will often crave them, for exceptionally it seems as though they took the edge off the pains. This latter point is one on which Baird[1] lays considerable stress, although we have personally not noted this sedative effect, nor does it seem to have especially impressed other observers. This gentleman states that "whenever the pains are of sufficient severity to cause considerable distress, I make *them a pretext* for the use of the faradic current, at the same time promising the patient *some* relief from her sufferings, but without explaining to her or her friends all the benefit which I expect her to derive from its use. In making the application to relieve pain, I pay no regard to the stage of the labor. Too much care cannot be exercised here in making the application to the abdomen not to use too small an electrode," else, the current being localized, painful contractions of the abdominal muscles are at once produced. "At first a current barely strong enough to be perceptible to the patient is generally sufficient, and it can be gradually increased if necessary. I then keep the circuit closed until sedation is obtained." It seems likely, then, that in addition to re-enforcing the expulsory pains through resort to electricity, we may spare the patient suffering, an advantage which no other oxytocic means at our disposal possesses.

During the third stage of labor it is questionable if electricity properly finds a place. When the uterus is given time, as it should be, to rest and recover tone after its efforts, under normal conditions judicious expression is all that is needed to complete the stage, and so long as there are no indications, the chief of which is hemorrhage, for active spurring of the organ, it is a sound rule to leave it alone, that the placenta may have the opportunity to separate normally. In the event of inertia and hemorrhage during this third stage, the faradic current will very likely evoke contractions, but the preferable indication then is to proceed to the manual removal of the afterbirth, a step which of itself will often cause uterine contractions. If it should not, the placenta having been removed, we are in the presence of inertia after the completion of the third stage, that is to say, post-partum hemorrhage is either a fact or is imminent, and in this complication electricity must take high rank as an adjuvant in treatment. It cannot, however, be depended upon alone to the exclusion of other recognized methods, for the fact must be emphasized that, although occasionally the uterus responds instantaneously, as it were, to the faradic stimulus, in other instances the action is too slow to meet the emergency, and in others still it may fail altogether. Often again, where the uterus contracts under the influence of faradism, it relaxes at once when the circuit is broken. The agent, hence, is one not to be depended on in this emergency, except in conjunction with other well-known means.

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[1] Loc. cit., b. 479, 480.

To summarize then the facts in regard to the value of electricity during labor, as they present themselves to us from a careful study of the contributions to the subject: The agent may be considered a valuable aid to the parturient during the second stage, in that by means of it we are able to assist the expulsory forces, and there is reason further to believe that a certain amount of sedation is exerted; during the first and the third stages of labor there are means at our disposal for assisting the parturient which better fulfill the indications, that is to say, rest during the first stage, expression during the second stage; after completion of the third stage, in the presence of more or less inertia, electricity may be looked upon as a decided adjuvant to the routine methods at our disposal, but it cannot be depended upon alone to avert an impending or to check an existing hemorrhage.

It is but just to state that in reaching these conclusions we have endeavored to draw a happy mean between those observers who are enthusiastic in regard to the value of electricity in labor and those who can see no good in it. The diversity of opinion is very striking among practical obstetricians. Thus, to refer only to the views advanced of later years, Playfair, in discussing Kilner's paper on the induced current during parturition,[1] said that he had tested the current and it had proved a failure, possibly because he lacked the special skill, and that if special skill were needed, it could not be generally used. He had found its effects in diminishing pain slight, and not to be compared with other means at our disposal. He considered it useless as an oxytocic. On the other hand, Murray, of New York, has treated over fifty cases of uterine inertia by means of the faradic current and with uniformly good results; Tripier and Apostoli are strong advocates of faradization; Robert Barnes states[2] that by means of electricity the uterus can be made to contract, when it resists the influence of what may be called "the diastaltic remedies," although he cannot rely on the agent in that its effects are not always permanent, an objection which is applicable with peculiar force to its utility in case of post-partum hemorrhage; Lusk says that "probably the faradic current is a most efficient agent in securing contractions of the uterus," but then it is rarely on hand when needed; finally Baird, who has used electricity in obstetrics to a greater extent than any one in this country, claims that the agent "stands unrivalled as an oxytocic." In his hands it has subserved the following purposes: 1. To modify the pains of labor; 2. To favor a more rapid dilatation of the os; 3. To promote more vigorous uterine contractions; 4. To add tone and strength to all the muscles engaged, and increase their power of doing work; 5. To abridge the time occupied by the labor; 6. To prevent shock, exhaustion, and post-partum hemorrhage; 7. To insure contractions of the uterus in cases of instrumental delivery; 8. To arrest hemorrhage and accelerate labor in cases of placenta prævia; 9. To prevent an undue expenditure of nervous force, in all cases of debility from whatever cause, thus leaving the patient in a condition to secure a speedy and favorable convalescence.[3]

In regard to the variety of electricity which may prove of service in the condition which we have referred to, there can be question simply of faradism, since, as we have stated, this is the only variety which the obstetrician can be expected to have with him in the immediate emergencies of labor. Fortunately, this is the very current which is most likely to fulfill the indication, and if it should fail, there is no ground for thinking that galvanism would answer. The methods of application we have already spoken of, decidedly the most convenient being to give the patient one electrode, hold the other in one hand, and complete the circuit by means of the other, grasping or massaging the uterus through the abdomen.

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[1] Transactions London Obstetrical Society, 1884.

[2] System of Obstetric Medicine and Surgery, p. 595.

[3] Baird, loc. cit., p. 744.

The Induction of Premature Labor.—In our systematic treatises on obstetrics electricity is hardly recognized as an agent deserving of serious consideration among the means to be resorted to for the purpose of inducing labor. Lusk, for instance, classes it among the methods which are not entitled to anything more than mention as having been suggested; Schröder ranks it with the agents which have only a historical value; Playfair says that it is a means too uncertain to be relied upon, and that it is irksome both to the patient and the practitioner; Barnes, after testing it in three cases, while he succeeded in inducing labor, found the method tedious and sometimes distressing to the patient. Notwithstanding these views, a number of instances have of late years been reported, which seem to speak quite strongly in favor of this method of inducing labor. Bayer,[1] from his experience in eight cases, claims that electricity is the best, safest, and most certain means of inducing labor; and Baird records a number of instances where the agent was of unquestionable value, although he used it in connection with local dilating measures. The most recent writer on this subject is Brühl, who reports[2] in detail seven cases in which the value of electricity was carefully tested. He used, as also Bayer, the constant current, and these cases may be taken as typical of what may be expected from resort to galvanism. His conclusions are, and the record justifies them, that, while the method does not carry with it special risk to the mother or the fœtus, its effects are uncertain, and if the applications be persisted in, the uterus may be rendered so irritable as not to respond readily to other means of inducing labor in case it becomes requisite to resort to them. In not one of the instances he reports was galvanism alone effective; in three it failed altogether; in four contractions were evoked and the cervix partly dilated, but these contractions had to be re-enforced by other means. It is to be noted, further, that galvanization was repeated from two to twenty-four times, and that from five to twenty-eight days was required, even in connection with other means, to attain the desired end. The length of time and the number of applications requisite were about the same in the cases reported by Bayer. We may fairly, hence, conclude that galvanism is hardly entitled to consideration among the means for inducing labor, since not uncommonly, where interference of this nature is called for, the welfare of the patient is opposed to the waiting which this current necessitates. In regard to faradism, when used alone, the same general conclusion is warrantable. Owing to its acknowledged greater power of inducing muscular contractions, the time requisite for starting labor by means of it is likely to be considerably shorter than that demanded by galvanism. But the point to be emphasized is that although contractions of the uterus may be evoked, they are very likely to die away as soon as the stimulus is withdrawn, and to maintain them some adjuvant means must be utilized. This is precisely what Baird did in the instances he has recorded. He faradized the uterus, and at the same time dilated the cervix by his finger and Barnes's bags, and was thus enabled in seven cases to induce labor in less than ten minutes. It is at once apparent that the combination of these two means has advantages over any recognized method used alone, and herein would seem to lie the reason why electricity, in the faradic form, may be classed among the means suitable for inducing premature labor. It is assuredly entitled to further tests, for although the ultimate result may only be its estimation as an adjuvant, as such there is ample scope for it in an emergency where, on speedy result, the welfare of the mother and of the fœtus not infrequently depends.

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[1] Ztschrft. f. Geb. u. Gyn. XI. I.

[2] Archiv f. Gyn. XXX. I.

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